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Practical Notes on Dyeing Aniline Black

By A. J. HALL, B.Sc., F.I.C., F.T.I.

Aniline Black dyeing remains an important dyeing process in spite of the increased use of rayon in cotton goods. Equally satisfactory dyeings may be obtained by means of the copper and prussiate processes but each of these processes yields a characteristic dyeing as regards shade and fastness to chemical influences. Practical details of both of these processes are given together with a description of the necessary plant. The various precautions and expedients necessary for the production of satisfactory Aniline Black dyeings are enumerated. Methods for increasing the fastness to greening of Aniline Black shades are described, and proved tests by which Aniline Black dyeings may be examined are given. The modifications of the usual dyeing processes such that they can be applied to cotton fabrics containing viscose or cellulose acetate rayons are described.

IN SPITE of the fact that it has been known for nearly one hundred years that a black pigment can be produced by oxidizing aniline, and the dyeing of cotton and other textile materials with this oxidation product has been practiced over a half century, certain difficulties are associated with this dyeing procedure sufficient to deter the ordinary dyer from undertaking it. The experience of the writer suggests that these difficulties certainly do exist but that they are much over-rated.

Main Difficulties

The two main difficulties are that a satisfactory dyeing plant must be available and that a procedure of dyeing must be adopted which does not cause tendering of the material being dyed. Actually the plant is not expensive and the difficulty of securing a satisfactory dyeing procedure not insuperable. So that there is really no reason why an ordinary dyer should not fit himself up to dye Aniline Black provided that he can secure a reasonable amount of business.

At the present time it is possible to purchase complete and perfectly satisfactory plants for dyeing Aniline Black from the usual machine makers and on the other hand it is possible to build up the plant in the works and take advantage of any plant which may be lying idle. Either method can be made to give good results.

To a certain extent the dyeing method is dependent on the plant employed since plant and method are intimately connected. If a rapid dyeing process is required then the plant must either be large or the padding liquor have a composition such as to favor a rapid oxidation. Also the plant and method must be correlated according as to whether the copper or the prussiate dyeing process is used. But in general it is possible to establish all the necessary details governing the plant and dyeing method on a very small scale so that final adjustments on the large scale are more or less insignificant.

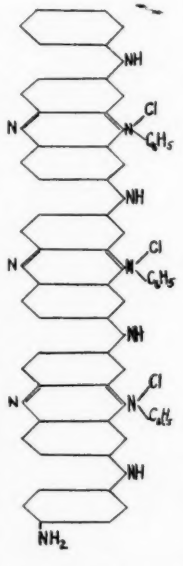
Methods

Right at the commencement of undertaking to dye Aniline Black it is important to decide as to which method to be used—it must be the copper or prussiate method. There are advantages and disadvantages associated with either method and it is quite incorrect to maintain that one is much superior to the other. It will be remembered that Aniline Black is formed by oxidation of aniline in the presence of an acid, an oxidizing substance, and a catalyst to promote the oxidation. Generally hydrochloric acid and sodium chlorate are used in both the copper and prussiate processes since these are the cheapest acids and oxidizing substances respectively (sulphuric acid cannot be employed because it gives an insoluble precipitate with aniline.) The catalyst may be a copper salt such as copper sulphate or copper chlorine (in the copper method) or it may be sodium or potassium ferrocyanide (in the prussiate method).

In comparing the dyeing results of the two methods it is necessary to point out that not only does the method affect the rate and tendering possibilities, but it also has an influence on the shade of black obtainable. This latter consideration is frequently overlooked but nevertheless it

is often most important. The copper method usually involves the use of a padding liquor somewhat more acidic than that used with the prussiate process and thus the copper method is usually considered more dangerous as regards tendering of the dyed goods. But to a large extent this danger can be offset by suitable modification of the conditions of dyeing so that dyed fabrics may be produced having equal strength by either process. Nevertheless in the case of materials which are exceptionally fragile and whose tensile strength is weak before dyeing it is advisable to use the prussiate method.

But the nature of the black pigment produced in the oxidation of aniline necessary depends on the conditions of oxidation, and since Aniline Black is formed by linkage of a large number of aniline residues as indicated by the following formula:



it is easily possible to vary its constitution slightly. Such variations result in a shifting of the absorption spectrum of the pigment either towards the red or the blue end of the spectrum so that the shade of the dyed fabric is affected accordingly. Now it is unlikely that exactly the same pigment will be formed in the copper as in the prussiate process and thus it happens that these two processes yield quite differently dyed shades. For some markets the prussiate shade is preferred while for others the copper is insisted upon. Unfortunately, it is almost impossible to top a prussiate dyeing with direct or basic dyes to enable it to pass as a copper Aniline Black or vice-versa. In fact, it is most difficult to improve either type of Aniline Black by topping methods. Hence in deciding upon installing a plant for dyeing Aniline Black it is necessary to be quite definite as to the type of black which will be dyed.

But the shade of Aniline Black dyeing is not entirely dependent on the composition of the pigment formed within the fiber; part of the shade is dependent on the amount of mineral pigment also present in the Aniline Black pigment. Thus in the case of a prussiate black there is always present a small proportion of Prussian Blue, while with a copper black a similar but somewhat smaller proportion of copper (probably in the form of copper oxide) is fixed within the Aniline Black pigment itself. This mineral pigment plays quite an important part in deciding the shade of the Aniline Black and if destroyed or removed the dyeing on the fabric usually assumes a drab and unpleasing appearance.

Prussiate Aniline Black

Prussian Blue is formed in the prussiate process by decomposition of the sodium ferrocyanide used with formation of an iron salt which immediately combines with the remaining ferrocyanide to form the blue pigment. When a prussiate black dyeing is treated with warm dilute caustic soda this Prussian Blue pigment is at once destroyed; sodium ferrocyanide can be readily detected in the aqueous extract and ferric hydroxide remains in the fabric. The presence of the iron hydroxide gives the fabric a very bronzy or red appearance and quite spoils the shade of the Aniline Black. On the other hand, alkaline treatment of a copper black dyeing does not cause such a reddening mainly because copper hydroxide is a greenish blue and not red.

Process

Turning now to the actual process suitable for dyeing a prussiate Aniline Black it will be found that the following padding liquor gives satisfactory dyeings:

Aniline	29 parts
Hydrochloric acid 28° Tw..	29 parts
Sodium chlorate	18½ parts
Sodium ferrocyanide	25 parts

This liquor should be made up to about 40 gallons with cold water, and should then have a density corresponding to 14° Tw. In use this liquor may be employed either stronger, say up to 19° Tw. or weaker, say down to 12° Tw., the strength being adjusted to suit the fabric being dyed.

The Plant

The plant should comprise a two or three bowl mangle, about sixteen drying cylinders and a steaming chamber. Fabric is impregnated with the above liquor in the padding mangle and from there it passes over the drying cylinders and through the steaming chamber. Preferably the mangle contains three bowls—an India rubber bowl (not directly driven) between two vulcanite driven bowls and it is advantageous to have more than one mangle.

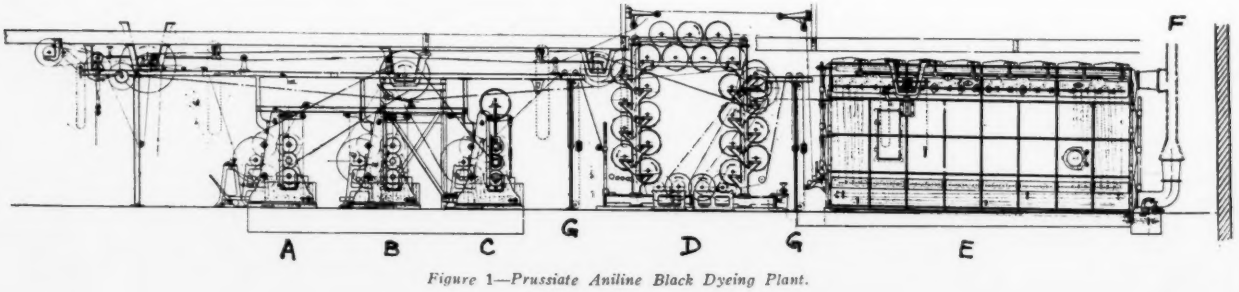


Figure 1—Prussiate Aniline Black Dyeing Plant.

The drying cylinders are of the usual construction but must consist of copper (not tinned iron) cylinders. The steaming chamber is usually constructed of brick and contains an upper and a lower series of spaced copper rollers over which the fabric passes vertically upwards and downwards. A complete modern plant (Mather & Platt, Ltd.), is shown in Fig. 1 in which A, B, and C are three padding mangles, D is a set of drying cylinders, and E is the steaming chamber ventilated by means of the adjustable flue F. G is the usual type of Mather & Platt compensator which takes up slack in the fabric if the different sections of the plant temporarily fail to synchronize in speed. The steaming chamber contains closed steam coils for heating it but it is also usual to blow into the chamber live steam in order to maintain a suitable humidity.

After-chroming Plant

Adjacent to the above described plant is an after-chroming plant. Formerly the fabric leaving the steaming chamber was batched on rollers and treated with a warm sodium bichromate solution in a jig. This is not an economical method and should be replaced by a continuous chroming plant. The usual type of open-soaper followed by drying cylinders and similar to that shown in Fig. 2 is very convenient for this purpose. This soaper should contain at least five compartments but it is better to have six or more. Actually no soap is used. The steamed fabric is led through the first compartment which contains a cold 0.5% solution of sodium bichromate, passes through the nip of the first mangle to remove excess of this liquor, and then immediately enters boiling water. The fabric then passes through the remainder of the compartments which contain warm flowing water so that immediately before passage over the drying cylinders it has been freed from all soluble substances. After drying, the fabric is ready for finishing and should have a deep pleasing black shade. It should be noted that washing of the fabric in the open soaper is much assisted by having a water spray directed on the fabric immediately before each nip.

From the foregoing description it is evident that Aniline Black dyeing is easily carried out once the plant has been erected. The rate of dyeing is up to 30 yards per minute, but the rate of after-chroming can exceed this considerably if necessary.

There are various odd quirks which experience has discovered and which assist the smooth running of a prussiate Aniline Black dyeing plant. Firstly, no alkali should be present in the fabric before dyeing. It will be noted from the composition of the padding liquor given above that an excess of aniline is present. Actually the composition shows that aniline hydrochloride and aniline are present together in admixture. There is obviously insufficient acid to neutralize any alkali that the fabric may contain except by detriment to the formation of the Aniline Black. Consequently any alkali present leads to the formation of white resist patches. Experience shows that alkali is generally to be found in the selvedges of a fabric if it has been prepared for dyeing by an alkali treatment; in such cases the dyed fabric is found to have white selvedges. The remedy consists of using the least possible amount of alkali in preparing the fabric or by including a souring process at some stage before dyeing. If fabric appears with white resist marks a convenient method of correcting, this consists of souring the fabric in dilute hydrochloric acid and then redyeing using a padding liquor of about 9° Tw. If the padding liquor is weak in this manner then the fabric does not become tendered by the second dyeing.

Steaming

As previously noted the rate of dyeing is up to 30 yards per minute. This requires a steaming chamber of such size that it holds about one piece of fabric of say one hundred yards in length. The fabric will then occupy about four to five minutes to pass through this chamber.

If satisfactory shades are to be obtained then great care must be paid to the amount of drying which the fabric has before entering the steaming chamber. Only a moderate amount of steam pressure should be used for the drying cylinders and the fabric should leave them just dry. The black will not develop sufficiently if it is passed wet into the steaming chamber, and on the other hand the fabric will certainly become tender if it is dried too much. If the fabric is steaming on the second cylinder from the end of the drying range it is found to be suitably dried.

A considerable amount of live steam is required for the steaming chamber but the fabric leaving this should be dry and not damp or wet. The temperature of the chamber should be as near 100° C. as possible, and under these conditions the wet bulb should read about 90° C. Such humidity conditions favor the production of a well dyed fabric. Fabric entering the steaming chamber (that is, as

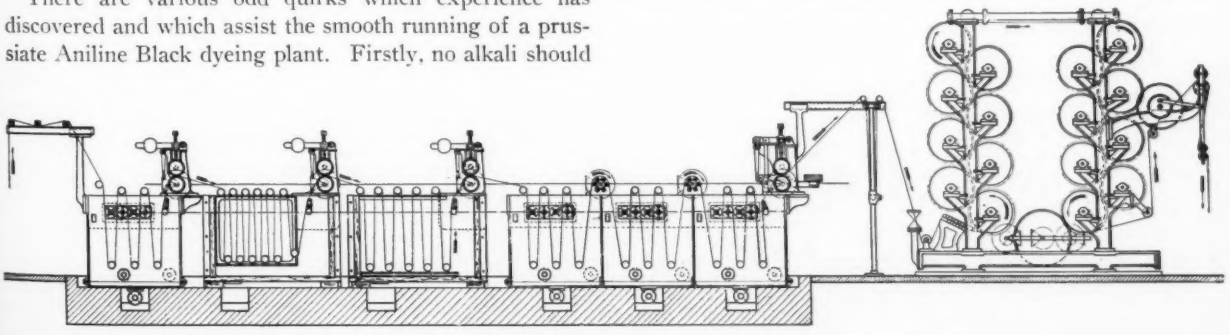


Figure 2—After-Chroming Plant for Aniline Black.

it leaves the last drying cylinder) should be of a yellowish green color; after passage through the steaming chamber it should be a deep black. The atmosphere around the steaming chamber usually has the odor of cyanides and is somewhat poisonous so that adequate ventilation is necessary.

An important feature of the steaming chamber is that no condensed water must be allowed to fall on the fabric since such water prevents complete formation of the black and thus leads to spotted fabric. In the usual construction of steaming chamber the roof is covered inside with steam heated plates; these prevent condensation of the live steam blown into the chamber. But in spite of these precautions condensation occasionally occurs with disastrous results unless speedily checked. In order to minimize the effect of falling water drops the passage of the fabric through the steaming chamber should be effected as shown in Fig. 3. According to this arrangement the fabric leaving the steaming chamber is led over the whole of the upper series of rollers and is between the roof and any fabric

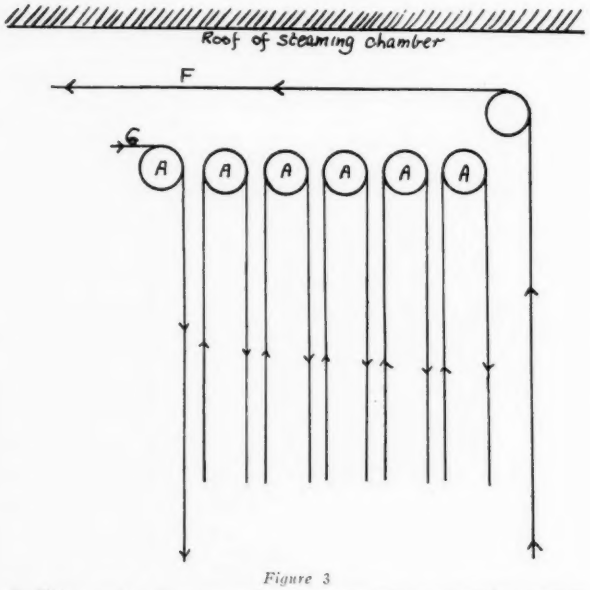


Figure 3
A—Upper series of copper rollers in upper part of steaming chamber. G—Entering fabric. F—Outgoing fabric.

underneath. Falling water drops will thus be intercepted by this fabric before they are able to fall on fabric entering the chamber and on which is only partly steamed. Since the drops do not affect the shade of a fabric which has been fully steamed it is evident that such condensation is harmless, the fabric when in that stage susceptible to the action of water being thus protected.

Curling

Aniline Black is widely applied to fabrics which are subsequently to be made into umbrellas and this type of fabric frequently has stripe and cord effects. When the edge is corded it has a great tendency to curl-in while passing through the steaming chamber. Once curling has commenced it rapidly increases and causes uneven dyeing. A very simple yet ingenious method for preventing this curling lies in inserting in the selvedges, on either side, brass pins each of about four inches in length as shown in Fig. 4. These pins are parallel to the weft and absolutely prevent curling; they should be removed as soon as the fabric emerges from the steaming chamber since if left in the fabric they may cause damage to rubber bowls through which the fabric may pass in the after-chroming plant.

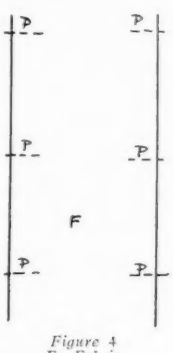


Figure 4
F—Fabric.
P—Brass pins.

Importance of Chroming

It will be noted that in the after-chroming process the method of applying the sodium bichromate is somewhat peculiar. As a matter of fact the chroming is an important process since it seriously affects the shade and the fastness of the black; it will be remembered that after-chroming is necessary to convert the black pigment into the ungreenable form. If the sodium bichromate solution is too hot or too concentrated then the black pigment becomes over-oxidized and gains a reddish tone which is extremely undesirable. But if the after-chroming is insufficient then the black is readily greenable when exposed to reducing gases such as sulphur dioxide. If the sodium bichromate solution is slightly acidified with acetic acid then the shade of the black remains greenish but is not so fast as if this addition is not made.

Immediately after leaving the steaming chamber the fabric contains all the residual substances from the padding liquor. A small amount of sodium chlorate is present, a considerable amount of hydrochloric acid and practically all the sodium ferrocyanide is present in the form of sodium ferricyanide (due to oxidation). If these substances are washed out of the fabric before after-chroming it is found that the resulting shade is definitely weak. But it is probable that this effect is also largely due to the presence in the fabric of free aniline which has escaped oxidation. Having regard to these facts it will be seen that the method described above of after-chroming by leading the fabric (directly from the steaming chamber) through the cold standing bath of sodium bichromate and then directly into water is convenient. Experience has shown that it is remarkably good and leads to the production of a fast and pleasing tone of black.

It is necessary that the bichromate bath should be cold. Attempts to maintain this bath warm or hot result in rapid chemical oxidation and reaction between various substances dissolved out of the fabric and in a short time a scum of insoluble matter forms; this clings to the fabric thereby causing much trouble. It is advisable however from time to time to add a small proportion of free aniline since this assists the formation of a really fast ungreenable shade.

(Continued on page 319)

Important Factors Affecting the Future of the Textile Industry*

By RICHARD G. KNOWLAND

Vice-President and General Manager, Bigelow-Sanford Carpet Company

The most important decision that an industrial concern can make today is whether it wishes to keep on operating or will fold up. If operations are to be continued, then business must be carried on about as usual except that extreme care must be taken with respect to innumerable items which in ordinary times are not nearly so important, even though such items may be fundamental. If a concern decides to fold up and go out of business, there is, of course, no more to be said.

AS TO what must be done by an industrial concern that decides to stay in business, we may summarize the necessary qualifications for success along the following trite lines:

1. Make what the public wants.
2. Sell it for what they can pay.
3. Perform these operations at a cost that yields a profit.

Under one or another of these points are covered all the efforts that must be expended in order to get the most out of any given industrial concern. This does not mean that such efforts even though wisely conducted will invariably yield a profit, but it does mean that such efforts wisely conducted will yield the largest return that it is possible to get under any given set of conditions.

In making what the public wants, it is obvious that merchandise must be well styled, and by this term we mean styled to suit the ultimate consumer as well as the buyer in the store. Many lines of merchandise depend for the amount of promotion they receive in the retail store on the acceptance that they have with the buyer. Consumer acceptance, of course follows with good styling and with quality consistent with the price of the article. In styling the merchandise allowance must be made, of course for a suitable selection. This selection must embrace enough patterns or types of styling to meet any reasonable demand which offers sufficient volume of sales to make it worth catering to. Since long lines of styled fabrics result in high manufacturing costs per pattern, in heavy inventory risks and in the danger of accumulating large stocks of not too saleable goods, it is obviously profitable to make the lines as short as possible. The better the designing and the better selection of patterns provided, so much shorter, as a general rule, may each line of products be. The shorter the lines, also, the larger will be the turnover per pattern and the lower.

As to the difficulties involved in styling lines so that they will be saleable, it is recognized that these form a subject for study themselves, but it is not the purpose at this time to introduce details of this sort which vary from one type of textile fabric to another.

It should be mentioned, however, that the influence of properly handled styling on promoting turnover and consequently low inventory risks, as well as furnishing the biggest selling point of all to the consumer, is something not emphasized as strongly as it should be. This is particularly true today when inventory risks are not to be undertaken lightly.

With these remarks concerning the styling, we may pass on to the question of selling. Certainly in these days, there is no single problem connected with the industry so important as the selling of its merchandise. The first cardinal point in any sales operation is undoubtedly the determination of the market. By this we mean, where are the customers located, how many are there, what is their size, how and when do they buy, what are their credits, and their capacity for handling merchandise? Next a determination must be made of how the accounts are oriented geographically with respect to trading centers, transportation facilities, cost of transportation, and other related items. From these facts can be developed the expense of moving salesmen about the territories. A program must then be laid out determining whether sales will be made by wholesale distributor, or whether they will be direct, or if a combination of the two methods will be used. If company warehouses are a necessary part of the distribution system, their locations must be determined, the sizes established for each location and the cost of operation estimated. These factors are dependent upon the capacity of the local market (as determined in the survey previously mentioned) to absorb merchandise. They are also determined by the shipping facilities and by the promptness with which customers expect delivery of the goods which they have ordered.

If the sales approach is to be made direct, the customers must be broken down into classes of accounts and decisions must be made as to how often the customers in each class of accounts are to be approached in order to effect a sale. Having done this, and having determined

*Address at Textile Forum of National Association of Cotton Mfrs., April 15th, Boston, Mass.

how many calls each salesman can make in a locality in a day, it is possible to break down the sales area into individual salesman's territories which may then be grouped as circumstances direct into sales districts.

That form of compensation system which is considered best, under the circumstances, may then be arranged and the sales cost of covering the selling area may be fairly accurately determined.

The question of advertising and sales promotion must be also developed along with the above points. Generally speaking, the purpose of advertising is, of course, to build up both consumer acceptance and consumer demand, if these things are at all attainable. Little can be done along these lines, unless the goods to be merchandised possess individuality and are marked with a distinguishing brand or name. This matter of advertising is so highly specialized that it must be passed over with these few remarks, but undoubtedly the necessity for an advertised promotion of styled merchandise is of fundamental importance if the goods are to be taken out of the category of just so many more units of merchandise. It is to be noted that we are distinguishing sharply between standardized textile constructions produced on a volume basis and so-called styled merchandise.

With reference to the control of production, we have already mentioned styling and balancing individual lines of products so as to have the minimum number of designs in a given line, this number being fixed on the balance necessary to please the trade. For a given volume of production, consequently, this procedure results in the largest obtainable weaving per pattern or, if the goods are prints, it results in the maximum possible yardage per design. All manufacturing costs are aided, of course, through this basic procedure.

In the purchase of raw materials, those procedures will have to be followed which good judgment indicates. In the case of the carpet industry using imported wool, experience shows that it does not pay to try to play clever tricks in every purchase on the long side. Based on a long observation of the cotton and domestic wool situations, there is a grave question in the speaker's mind as to whether it is cheapest in the long run to buy raw materials without long commitments. However as stated, these are problems that must be handled to suit each individual case. For the purpose of labor control, in order to insure low operating costs, some form of piece work and bonus payment is recommended for those operations adopted. If this method of payment is used, it must be kept under the most continual supervision of the most thorough sort. It must be accompanied by time studies of every operation whenever a change in equipment or operating conditions are encountered. An application of carefully controlled research and development as to new products, new equipment, an improvement of old products and old equipment must be continuous and energetic. In these hard times, no problem should be undertaken, of course, that does not have all the ear marks of prompt financial returns.

The utilization of waste and its minimizing as well as the control of imperfect merchandise and of all manufacturing losses should be subject to continual scrutiny.

If all the ideas mentioned above are carefully and thoroughly carried out, any industrial concern certainly should be able to hold its own against competition, provided its management is effective. If business conditions today are such that no concern can earn a profit, then it can only be said that a manufacturer who cleverly and well follows the above principles undoubtedly will preserve a stronger company than he could hope otherwise to do, and he will have a lead on less competent competitors when sales volumes, as a whole increase.

Your Association requested that the speaker discuss briefly what the Bigelow-Sanford Carpet Company is doing to meet present day conditions. The above outline presents, in a condensed form what we have been doing over a period of years and delineates the policy which is still being constantly pursued.

The matter of sales and production budgets are extremely important, and should always be set up periodically so that a barometer may be established for measuring sales and production performance. Without such budgets based on probable sales, there is absolutely nothing by which a company can steer its operation. This matter is of more importance than can be described in the few words of this talk.

There are in the trade many practices which cannot be ignored by manufacturers. Undoubtedly, price cutting on the part of retailers, chiseling of various sorts, the attempts of buyers to break down prices, the offer by manufacturers, of special price considerations, and the practice of style piracy are extremely serious factors in a styled industry. Time does not permit expansion of these subjects, but they are mentioned in passing as being among the really serious factors of the trade that must be allowed for continually in such times as these.

Of all single important manufacturing points to be kept in mind today, none is more important than to follow consistently the policy of never, under any conditions, producing goods at a rate greater than the rate of sales.

New Shade Card

The United Aniline Company, 156 Pearl Street, Boston, has recently issued a very complete shade card, showing dyeings of their Exlacil Acid Colors on woolen piece goods.

The Exlacil line is composed of superior types of dyestuffs from various manufacturers.

Copies of the shade card may be had upon request.

Blum Appointed Director

W. Robert Blum, of the United Piece Dye Works has been appointed a member of the Board of Directors of the Textile Color Card Association by Charles Pinnell, president of the color organization, it was announced recently.

Mr. Blum will represent the dyeing industry on the Association's Board of Directors.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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CALENDAR OF COMING EVENTS

Outing, Northern New England Section, June 10.

* * *

Meeting New York Section, May 27.

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Council and Research Committee Meeting
June 3, 1932—Boston, Mass.

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Meeting South-Central Section, May 21.

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Outing Mid-West Section in June.

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APRIL MEETING, NEW YORK SECTION

. . . The April meeting of the New York Section of the American Association of Textile Chemists and Colorists convened at 8:15 o'clock P. M. on Friday, April 22, 1932, at the Alexander Hamilton Hotel, Paterson, N. J., Mr. Robert H. Gaede, Chairman of the New York Section, presiding. . . .

Chairman Gaede: The meeting will please come to order.

I will ask Mr. Friedman to read the minutes of the last meeting. Mr. Hoppe said he would probably be here a little later tonight.

. . . Mr. Friedman read the minutes of the last meeting. . . .

Chairman Gaede: If there are no omissions or corrections, the minutes will be approved as read.

Our next meeting will be held in New York, and that will be our Annual Meeting of the New York Section, when election of officers takes place.

I would like to appoint on the Nominating Committee Mr. Carter, Mr. Wood and Mr. Stanton.

We have for our first speaker tonight another member of the New York Section. We have gotten a number of members to speak lately, and we are always glad to hear from our own members.

I would like to introduce Mr. Fred Schlayer, of the Atlas Electric Devices Company, whose subject will be: "Foretelling Color Fastness with an Artificial Sun." (Applause.)

Mr. Fred Schlayer (Atlas Electric Devices Company): Mr. Chairman, Fellow-Members: At the outset, I should like to thank you in behalf of the Atlas Electric Devices Company for the opportunity accorded us to present this

Proceedings of the American Association of Textile Chemists and Colorists

paper. Mr. C. W. Jameson, the President of the Atlas Electric Devices Company, and the author of the paper, joins me in thanking you, and regrets that owing to development work on the new Fade-Ometer he is unable to be with us this evening to present the paper in person. I shall therefore go to bat for him.

. . . Mr. Schlayer read his paper on: "Foretelling Color Fastness with an Artificial Sun." . . . (Applause.)

Foretelling Color Fastness with an Artificial Sun*

C. W. JAMESON
Atlas Electric Devices Co.

TWO generations ago Bismarck gave us a new noun "imponderables," meaning the thing which could not be weighed or gauged with any degree of accuracy. This word has since been given many applications.

Fifteen years ago the term "imponderable" would have been an apt reply to queries regarding the effects of sunlight, weather and washing on colors and materials. At that time the only positive test of these factors was the "test of time" which was usually made by the ultimate customer, at his own expense and risk.

Outdoor exposure tests of sun fading and weather resistance required too long a time, especially where the product was designed for years of service. Roof tests made no allowance for regional variation in climate. Outdoor tests made in New Jersey are a most uncertain criterion of how the product will withstand the summer sun of Arizona, a rainy season on Puget Sound or the proverbially sudden temperature changes of the Chicago area. Moreover, roof tests were not reproducible, as the weather in the same locality is never twice the same.

You doubtless remember the blue serge suits of 15 years ago. Nearly every man who bought his own suits at that time got "stung" on a blue serge. If worn much in the sun it often turned purple or faded to an unsightly, nondescript hue. Not all the blue serge suits of those days faded, but the customer never could be sure. For that matter, neither could the retailer or the manufacturer. Today one can positively determine, within forty-eight hours, whether a blue serge is sufficiently fast to sun light to guarantee it for one year against fading.

In the days when some of the manufacturers and distributors were still "testing it on the trade" the demand of the leaders in the industry and the buying public for faster colors was developing, and it grew rapidly. People were no longer satisfied to keep the shades in the living room closely drawn to prevent the sunlight from fading their rugs, upholstery and wallpaper. The sun parlor was replacing the old-fashioned dark parlor. The trend to outdoor life brought a demand for sunfast colors for garments of all kinds. A more rapid and positive method of predetermining color-fastness and of setting definite satndards was needed.

We are not qualified, as chemists, to answer many of the questions that might arise regarding the behavior of different kinds of dyestuffs. We are merely trying to give you a brief sketch of our experience in producing the standard apparatus equipped with an artificial sun or light source which resembles June noonday sunlight on a clear day at sea level. It is not necessary to tell of the great number of discouraging obstacles which presented themselves at the early stages of our work. As we improved and refined the Fade-Ometer, the demands of the industry became more exacting. This was a very encouraging sign, as it clearly indicated that the textile chemists and colorists were critical and alert.

It was during the early stages of the world war that our company began its series of experiments in developing an artificial sun in the form of an enclosed arc. After the mechanical features of the arc were perfected, we were confronted with the problems of the size of specimens to be tested, distance from the light source and the temperature at the swatch. It may not be interesting to review our many experiments by means of which we arrived at these figures, as I fear that, if we went into full detail on every step of the work, we would cease to be interesting, and, since there are more interesting items on the program that you are looking forward to, we will touch lightly on the most important problems.

Light Source

The hurdle that presented itself, after completing the mechanism of the arc lamp, was the selecting of carbon electrodes for the reproduction of a light equal to June

*Presented at April Meeting, New York Section.

sunlight. It is, of course, understood that the arc lamp, regardless of the carbons eventually selected, should be able to burn with the same intensity without interruption for at least 22 hours. After exhaustive experiments with the various types and sizes of carbons, we decided on a type that would produce a violet light, providing that the arc, quite contrary to the street arc, would operate on a power circuit of 200 to 250 volts, either alternating or direct current with an arc voltage of 130 to 145, using cored and solid carbons. The current consumed was approximately 13 amperes. The arc length was 1¼" to 1½". It should be said that the common conception of an arc lamp was one consuming 8 amperes, with ¾" gap and 55 to 90 volts across the arc. The fact that we took liberties with the old orthodox arc lamps caused a great deal of comment and criticism from our colleagues in the electrical field.

After a brief description of the early Fade-Ometer, we will return to the light source and transmission qualities of the glass globe used.

Our early Fade-Ometer consisted of two 19 and 20 inch vertical cylinders, one above the other. The lower one contained openings or windows around its circumference, in which the specimens under test were suspended. The size of the specimens at that time was 2" x 4". Half of the specimen was exposed to the light and the other half was shielded. The specimen-holding drum was movable and could be elevated for the purpose of renewing the carbons and cleaning the globe. The lower cylinder was 20 inches in diameter, holding the specimens 10 inches from the center of the arc.

The upper cylinder supported the arc lamp and the resistance.

The temperature at the specimens in this first model was 120 to 145 degrees F. which, of course, proved to be too high. Our next model was equipped with an electric ventilator, which made it possible to maintain a temperature at the specimens of 98 to 104 degrees F.

Our entire summer was spent by us in making fastness to light tests on 250 different dyeings. These specimens were in the form of dyed textiles, such as silk, wool and cotton and a small number of lithographic inks on paper. To us, who were not dyestuff chemists, these were representative specimens of dyed materials, suitable for testing purposes. Yes, we've learned a few things since those days.

It was quite a shock to us to learn how woefully inadequate our tests made that summer were when compared with the 1508 dyeings, with all factors definitely known, which represented the specimens used for testings by the Research Committee of the A.A.T.C. & C. and the Bureau of Standards in 1926.

Strange as it may seem, our fading ratio on dyeings, from our simple tests made that summer, compared favorably with the ratios determined by the Bureau of Standards, from their tests covering two and a half years.

This was not the case with lithographic inks. The ratio established by us for these differed.

This discrepancy will be better understood if we quote from the Bureau of Standards Research Paper No. 100, by Dr. Wm. D. Appel.

> "According to the manufacturer, one 'fade-ometer' hour is equivalent to 1.3 hours of summer sunlight for textiles and 5 hours of summer sunlight for printing inks. The lithographic prints, however, did not fade as much in 1.2 'fade-ometer' hours as in 6 hours exposure to sunlight at Washington, and it was determined by close observation of the prints that 2.33 'fade-ometer' hours was approximately equivalent to 6 hours sun exposure for the inks. Longer exposures gave the same time ratio for equivalent fading."

Returning to our early efforts in introducing the Fade-Ometer, it may be interesting to hear that the first dozen were offered to some of the leaders in the textile industry to try out. We of course hoped they would be purchased. Instead, they were all returned. A large number did not show much sign of having been used. (This entire group have since purchased Fade-Ometers.)

The rejection, we learned, was due to the fact that the average textile chemist thought that most of the radiation responsible for fading of colors was in the region of the ultra violet (279 to 290 mu). They, therefore, objected to any artificial light source enclosed within a glass globe. A Fused Quartz globe, in their opinion, would be the only solution.

When attention was called to the fact that neckties, especially those of the bright hues for the exclusive (Harlem) trade, would fade in a comparatively short time when displayed in show cases or store windows, this observation proved conclusively that the wave lengths in the violet and ultra violet region were not the only factors to contend with when selecting a light source.

Like the Scotchman, who, when locked up all night on the jury, explained to his wife that he would have been home early had it not taken him so long to convince the 11 men that the defendant was innocent, it likewise took us a great deal of time to convince some of the textile chemists that the violet carbon arc, consuming cored and solid carbons of an extra fine grade, and enclosed in a globe of Thermo clear glass, approximately 2.0 mm thickness, would produce a light that would agree with the effect of sunlight as closely as is required for practical testing.

The subsequent general acceptance of the violet carbon arc (as found in the Fade-Ometer) as an artificial sun was greatly accelerated by its approval by scientists.

Dr. Coblentz brought out the fact (May 25, 1926) that a violet carbon arc, operating on 220 volts, 12.6 amperes, direct current, enclosed in a thermo clear globe, would produce a radiation, as shown in the following figures, compared to solar radiation at Washington, D. C., May 25, 1926, 11 A. M. to noon.

TABLE No. 1

Spectral Range	% of Total Radiation Thermo Clear Glass	Sun
279 mu to 290 mu	0.0	0.0
290 mu to 320 mu	0.0	2.0
320 mu to 360 mu	2.0	2.8
360 mu to 480 mu	18.5	12.6
480 mu to 600 mu	9.3	21.9
600 mu to 1400 mu	16.5	38.9
1400 mu to 4200 mu	22.1	21.4
4200 mu to 12000 mu	31.6	0.4

The total radiation at a distance of 38 cm (15 inches) from the center and at right angles to the arc on 12.6 amps. is 0.075 watts per cm. sq. as compared to sunlight by Dr. Coblentz.

From the above table you will note that there is discrepancy in favor of June sun in the region between 480 to 1400 mu. These wave lengths in terms of color would be from the green to beyond the orange.

Many suggestions have been offered to take care of this discrepancy such as by incorporating a high power nitrogen lamp as an auxiliary. Others are of the opinion that for the time being we should leave well enough alone and continue with the violet carbon arc.

It follows closely with the exception of the region of 480 to 600 mu where the violet carbon arc is 12.6 percent and between 600 to 1400 mu, 22.4 percent less than solar radiation. White Flame or Sunshine Carbons have been tried by Gordno, Appel, Cady and many others. They agreed with our early observation that due to the opaque deposit that coats the globe, together with the fact that if burnt as an open arc, excess heat is generated. It was likewise noted that the final fading results were more erratic than when exposed to an enclosed violet carbon arc.

Quoting from the report of your Sub-Committee on Light Fastness, 3—Series 4 by Wm. H. Cady and Wm. D. Appel, in referring to the 1508 specimens tested—"The presence or absence of a window glass cover over the samples during exposure in the standard test has practically no effect on the fading of 74% of the samples and only a slight effect on 22% of them. It has a marked effect on the fading of the remaining 4% of the samples."

"Although the majority of the dyeings fade to about the same extent, relative to one another, in the arc exposure compared with the standard sun exposures (1 arc hour = 1.3 hours in the 'standard sun test'), fading in the arc light is different in quality from that in sunlight in many instances. Some samples fade entirely too much, others entirely too little, in the arc exposures, but the agreement between standard sun test and arc test is much better than between the former and the continuous exposure in a vertical position facing north."

Still quoting from the Sub-Committee report. "We find that out of 1252 samples, 59.1% compared with the outdoor exposure on clear days between 9:00 A. M. and 3:00 P. M. under glass 45 degrees horizontal facing south. 15.8% faded slightly more and 11.7% showed still more fade than outdoor exposure rays; 8.5% slightly less and 4.9% less fade was shown than the outdoor test."

It is hardly possible to make the Fade-Ometer 100% accurate and before this can be accomplished it may be necessary to petition Congress to bring about a reproducible June sunlight day for our standard.

The first Fade-Ometers, like the old Model "T" Ford, could stand improvement, yet they gave valuable service to the industries and the individual. Following the toning down of the temperature, we made other improvements and refinements, including the humidifier, which, by the way, is not taken very seriously by many of the users.

Even though many were not interested in filling the humidifier pan with water, all of them would agree that the Ventilator was a valuable contribution to the Fade-Ometer as it maintains a constant temperature between 98 and 104 degrees F.

The voltmeter for reading the arc and line voltage and the four-point switch for varying the resistance in the arc circuit so as to balance the varying line voltages that range from 200 to 245 volts was a valued improvement. Using the voltmeter as a periodic check on the arc and line voltage, it is possible to ascertain whether or not the arc is functioning properly.

By manipulating the four-point switch, controlling the arc resistance, it is possible to select suitable resistance to balance the prevailing line voltage.

Acceptance of the Fade-Ometer came gradually at first, then more rapidly as the machine proved its value and reliability.

The first foreign country to recognize the Fade-Ometer was England, where it met a keenly felt need of the British Textile Industry.

Three years after the first Fade-Ometer was shipped to England a Color Fading unit, bearing all the earmarks of a close copy, appeared on the British market. We felt quite complimented by this stamp of approval. With due credit to our overseas competitors, they, like ourselves, are improving their Fugit-Ometer, as it is called. Despite our British competition we are still enjoying Fade-Ometer sales abroad. Continental Europe as well as the Orient, in spite of the unfavorable rates of exchange, of the Pound, Kopeck, and the Yen, are taking their share. The demand for Fade-Ometers in America has been very gratifying indeed.

The Fade-Ometer is used in practically every branch of the textile and dyestuff industries, by paper mills, wallpaper manufacturers, printers, lithographers, laboratories and Government departments.

What constitutes a fast color? It would hardly be possible to find an answer which would apply to all the industries just referred to. It is a generally accepted

axiom that individual standards of fast colors must be set for individual requirements. Every colored material seems to require its own standard of fastness to light. These standards vary as widely as a Kentucky Colonel's idea of good whiskey differs from a Highlander's.

One of the outstanding ways in which the Fade-Ometer has been of value to the textile and other industries is by making comparative tests of dyeings, inks, etc. It has proved an ideal medium for predetermining the relative fading qualities of a number of specimens, tested simultaneously. As the fastest colors have in many instances proved to be not the most expensive, the Fade-Ometer has made some substantial savings for its users.

During the past decade the Fade-Ometer has played a noteworthy part in setting definite and satisfactory standards of color fastness for a number of products and materials.

For example, Commercial Standard CS16-29 for wall paper is based on a test with the "The Fade-Ometer or its equivalent."

At Sears, Roebuck & Co., Miss Weirick, in charge of testing laboratories, has set a rather definite standard for the color fastness of dyed textiles as she explains in her paper "The Textile Testing Laboratory" presented at the Quarterly meeting of the Piedmont Section and published in AMERICAN DYESTUFF REPORTER. The paper reads "We use the Fade-Ometer for determining the fastness of colors to light. The samples are exposed to the light for 40 hours and any changes in color noted at the end of 24 and 40 hours. If no change takes place at the end of 40 hours, a color is rated 'fast.' If very slight fading takes place but not sufficient to effect the general appearance of the fabric, the color is rated 'practically fast.' If marked fading occurs, the color is 'not fast.' Many changes occur between the 24 and the 40 hour period."

A noteworthy application of the Fade-Ometer was made by the American Tobacco Co. to assure that the lithographic inks used in its billboard advertising would not fade during the period of the posting. A single American Tobacco Co. national posting for 30 days costs several hundred thousand dollars, of which the cost of the posters represents only about 10%. No ink manufacturer would give a guarantee beyond the cost of the posters—a most inadequate compensation if the inks faded and the value of the advertising were impaired. But the company was able to predetermine, by 40 to 50 hour tests with the Fade-Ometer, which inks would fade and which would not.

Users of the Fade-Ometer have been noticeably alert to the possibilities of featuring the use of this machine in their advertising. The great mail order houses have shown illustrations of the Fade-Ometer in their catalogs, accompanied by descriptive matter telling their millions of customers how they use it to guarantee fast colors. Department stores and prominent clothing stores have done the same in their newspaper advertising.

A manufacturer of khaki to which the trade name "indelible" is given, shows in his bulletin how the Fade-Ometer and Launder-Ometer are used to assure his colors being indelible in fact as well as in name.

Recently our mail has brought in a circular from an ink maker and the bulletin of a rug manufacturer. In each case the manufacturer emphasizes the fastness of his colors and points to the fact that these fast colors are positively predetermined by means of the Fade-Ometer.

The extensive use of the Fade-Ometer in advertising has been very gratifying to us. It has played a part in establishing the Fade-Ometer as the universally accepted yard stick of color fastness. Undoubtedly in many an establishment where they thought they could get along without a Fade-Ometer, there has been a change of viewpoint when some competitor made effective use of the Fade-Ometer in his advertising.

And now a few words regarding the new Type FDA Fade-Ometer, the first announcement of which will appear in the 1931 Year book of the A.A.T.C. & C. In our efforts to help Fade-Ometer users to improve and standardize their products, it is but natural that we should improve the machine we furnish for that purpose.

The Type FDA Fade-Ometer will embody all the characteristics which made previous Fade-Ometers so useful and also a number of new features, including:

An aluminum shell, which encloses the samples

A water reservoir of polished copper.

Two four-point adjusting switches give better voltage control.

An ammeter.

A voltmeter.

A Circuit break for protection

An electric fan and an improved humidifier.

In the Type FDA Fade-Ometer the swatches in test will still be placed in metal holders. These, instead of being held against the hot cylindrical drum, will be suspended from a 20-inch ring above and surrounding the arc. The cone shaped metal shell, hinged at three points, surrounds the specimens. This metal shell takes the place of the canvas curtains found on the old model. The cylindrical polished copper water reservoir, 29 inches in diameter, forms the base of the machine. (Note:—photograph accompanies this paper.) The water reservoir, having a 14-inch opening in the center, is provided with a series of metal wire frames on which are sketched a special coarse woven cotton material. Since these wick-supporting frames rest in four inches of water, they provide 1600 sq. inches of saturated surface, through which air is forced by means of a vertical mounted fan placed in the center and below the bottom of the water reservoir. The object of the fan is obvious. It is of sufficient size and capacity to force an adequate amount

of air through the wicks, so that the specimens are tested in a humid atmosphere. A relative humidity of 52 to 60% is produced. It should be said that the fractional horse power motor driving the fan is controlled by a DeKhotinsky By-Metal Thermo Regulator, making it possible to maintain the temperature by automatically starting and stopping the fan between 98 and 155 degrees F. The testing temperature for textiles and lithographic inks is 98 to 104 degrees F. For auto topping material the Ford Company has set a standard of 145 to 155 degrees F. A thermometer well is furnished with each machine, in order to have a check so as to make it convenient to reset the thermostat. Other features worthy of mention are the voltmeter for reading the arc and line voltage, the ammeter for ascertaining the proper amount of current consumed. On a direct current Fade-Ometer, 12 to 13 amperes; on alternating current of 60 cycles, 15 to 17 amperes is the rating of the arc. This slight amperage increase, in favor of the alternating current, makes the arc on the two types of current equal in their fading rate. The rotary main line switch and two four-point adjusting switches make it possible to control the arc to a fine degree. A small circuit breaker is provided that will automatically trip, should the current rise above 18½ amperes and remain thus for 15 minutes or more. This circuit breaker is merely a protective measure.

Referring for a moment to the humidifier wicks, we wish to emphasize the fact that all air coming in contact with the specimens is filtered through these saturated wicks. This makes it possible to test delicate shades of silk without soiling them. Another feature, which is furnished separately to alternating current users, is an electric time recorder in the form of an electric clock with a 24-hour dial, equipped with one stationary hand and one hour hand. When starting up, the two hands are placed at the point corresponding to the time of the day. Immediately on closing the switch, the hour hand starts on its journey. If any interruptions occur during the small hours of the morning, the discrepancy will be noticed the next day and proper deductions can be made.

In closing, our thanks should be extended to such bodies as the A.A.T.C. & C., U. S. Bureau of Standards, the A.S.T.M., Lowell Textile Institute, Clemson College, U. S. Testing Co., Pease Laboratories and the many chemists and colorists who with their constructive criticism and helpful suggestions have enabled us to make progress with our work.

Discussion

Chairman Gaede: Thank you, Mr. Schlayer. I certainly see that the Atlas Electric Devices Company is keeping up with the times and improving their machinery. All they need on there is syncro-mesh transmission and free wheeling. But we are glad to see the improvements that are being made so as to make more standard results. I would like to ask if anyone has any questions to ask Mr. Schlayer.

Mr. Friedman: We have had occasion to test some materials and the effect of artificial light on the fading of materials. The problem was one which was caused by the fading of materials in show cases, and our experience bears out the statement that Mr. Schlayer has made about fading taking place in the absence of ultra-violet, taking it for granted that ultra-violet doesn't pass through ordinary window glass.

We tested a number of specimens of glass that were submitted to us, the claim being that fading would not take place if materials were kept under these various specimens of glass. The only glass that proved satisfactory was glass that you couldn't look through and, therefore, you couldn't use it for show case covering.

I would like to ask Mr. Schlayer why the Atlas Electric Devices Company furnishes two types of globes. I believe you furnish a thermo-glass globe and a Corex D globe.

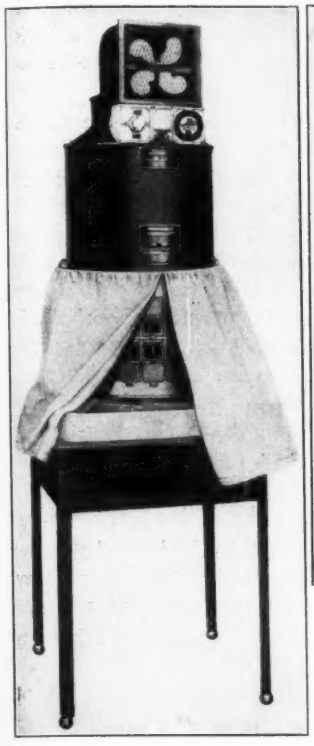
Mr. Schlayer: Mr. Friedman: The Corex D globe is furnished as standard equipment on the Weather-Ometer. The difference between a Corex D globe and the ordinary Fade-Ometer globe is that the Corex D globe gives us more ultra-violet transmission, especially in the region of 279 to 360 millimicrons.

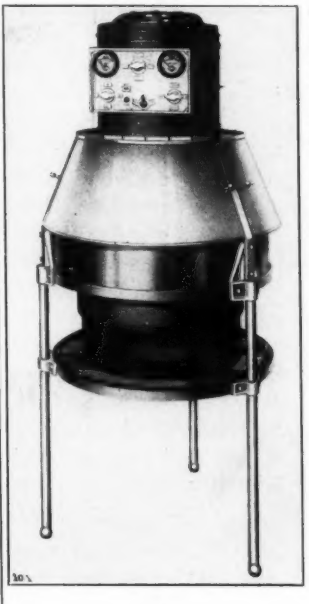
To illustrate: Between 279 and 290 millimicrons the Fade-Ometer globe gives no transmission, the Corex D gives 6 tenths of one per cent. Between 290 and 320 millimicrons, the Fade-Ometer globe gives no transmission, the Corex D gives 3 and four-tenths per cent. In the region 320 to 360, the Fade-Ometer globe gives 2 per cent and the Corex D gives 5 and nine-tenths. So we get more ultra-violet from the Corex D than we do from the ordinary globe.

We will not use the Corex D globe in the new type Fade-Ometer. The reason for that being that we have found out that, just as you say, the ultra-violet rays do not have any appreciable fading result on dyed textiles. That was also borne out by the tests that were made by the United States Bureau of Standards and the American Association of Textile Chemists and Colorists, where the report was that the tests made facing south at an angle of 45 degrees, under glass, and without glass, while they did show some variation, did not show any real appreciable variation.

Another thing I would like to call your attention to is that Mr. Cady and the research associate of the American Association of Textile Chemists and Colorists, conducted an experiment on forty different samples, using both the Corex D globe and the ordinary Fade-Ometer globe, and the report was that the Corex D globe showed slightly more fading.

You might say, why do we use the Corex D globe on the Weather-Ometer as standard equipment and use the or-





Above—Fade-Ometer Type FDA (1932-).

Left—Fade-Ometer Type CV (1925-1932).

dinary globe on the Fade-Ometer? That is due to the fact that the wave lengths in the ultra-violet, from the region 290 millimicrons to 360 millimicrons, have an accelerating effect on the breakdown of paint, varnish and asphalt films. We did use in the beginning an ordinary globe, but we found that we accelerate the test by using the Corex D globe. It must also be borne in mind that in the Fade-Ometer, or when using the Fade-Ometer, the average test is for about 50 to 60 hours, whereas in a weather-ometer, the average test would be perhaps 600 to 700 hours. I believe that will give you the information.

I expected to be asked a number of questions in regard to the Fade-Ometer, because as I explained to Mr. Gaede, the Chairman, while I am the representative for the Atlas Electric Devices Company, I am essentially in the dye stuff industry, and I am not here to say that the Fade-Ometer is 100 per cent perfect or anything like that. We know it isn't. But I thought, perhaps, there were a number of questions you people would like to ask, especially as regards the operation of the machine.

Member: What are the essential points of difference between the English Fade-Ometer and the American?

Mr. Schlayer: I am not familiar with the Fugit-Ometer although I understand they control the humidity and the temperature, and we are doing the same thing in this new type of machine. As a matter of fact, if any of you gentlemen are interested, I have some photographs here. We sort of changed the sex of the machine. There is the old machine. It looks like a lady. And there is the new machine, the man, and here are some photos of the first working model, giving an idea as to the aluminum shell. We have the holders hanging instead of in the metal drum. The fan is in the bottom, and then besides, we have the thermostatic control and better humidity control.

Mr. Hanson: We have an older type Fade-Ometer without a fan, and we have found in suspending a 16-inch fan over that Fade-Ometer we get better results. Have you any other suggestions to make?

Mr. Schlayer: In putting a fan over it, so as to blow down? On our model CV we place the ventilator also on top, but there is more of a suction action, and in that way cuts down the temperature. And in this new machine, and I am passing the photo around—this is just a working model, the smaller photographs are just working models—the machine won't be ready for another four weeks; but in the new model we have the fan at the bottom.

Mr. Hanson: Can we improve on our method with the machine we have?

Mr. Schlayer: You can by ordering a ventilator and humidifying unit, and if I may suggest something, in the event that you don't care to order a humidifying or ventilating unit, cut out the center of the table and put a fan inside. That has been done by several concerns, and it was done before we put the ventilator on the machine ourselves.

Mr. Hanson: Where do they keep the water then?

Mr. Schlayer: They kept the water around the outside. They didn't get the humidity that you get even with the old model that you speak of. The humidity is more desirable. As a matter of fact, in 1924, I made tests of 70 samples that were exposed in north Jersey, Tenafly, N. J., and Woodhaven, Long Island, and there were 70 samples, duplicates. My samples in Long Island faded in most cases about 25 per cent more, and in a few cases as much as 50 per cent more in Long Island as compared with Tenafly, N. J., and in my opinion that was due mostly to humidity. We have increased our humidity on the new machine.

Here is something I would like to call your attention to, because there are so many things that come up in the fading end of it. Here is a report by the Mellon Institute of Industrial Research. It seems that they are making an air pollution test, and this is a little more information on ultra-violet. It is dated Pittsburgh, April 19, and I cut it out of the "Herald-Tribune" on the 19th:

> "A burning glass effect on light clouds, huge enough to cover a city, has been discovered at the Mellon Institute of Industrial Research. The burning rays are concentrated ultra-violet light. The discovery accounts scientifically for grandmother's warning to beware of sunburn on half cloudy days in early summer. This extra ultra-violet radiation is described in an annual report of Dr. E. R. Weidlin, Director of the Insti-

tute. It was found by H. B. Meller, and assistants, during an air pollution investigation, which is still unfinished. 'It is possible', says a report from the Institute, 'to receive more solar ultra-violet radiation on some partly cloudy than on clear sunny days.' "

That may be of interest. I don't think it is generally known. We expect the ultra-violet when the sun is out. I believe we have all noticed from time to time on a cloudy day in the summer our eyes would smart somewhat and we couldn't look into the sky as well as we could when the sun was out. So there may be something in this report.

Dr. Otto Graenicher: Will you be kind enough to tell me which rays you consider to be most violent in action and what wave lengths?

Mr. Schlayer: I would say in the whole visible spectrum.

Dr. Graenicher: It depends on the color. They are differently affected by different rays.

Mr. Schlayer: I venture to say there have been no extensive experiments made in that connection. What you mean, for instance, is to take a series of dyestuffs and subject them to the yellow of the visible, with the green of the visible, with the orange of the visible, etc. That would be a matter of conjecture at present. I don't know.

Dr. Graenicher: You could pass light through colors.

Mr. Schlayer: It has been done, but not with any real number of samples. I might mention this: The Fade-Ometer is deficient in the yellow, the green and the orange end of the spectrum, and that is why, as mentioned in the report, something is said about making up for that difference by including a nitrogen lamp. This paper was gotten up by Mr. Jameson, the President of the Atlas Electric, and I presume Mr. Jameson means an ordinary incandescent lamp, nitrogen filled, of about 1,000 watts. We have been told that that would make up to some extent for the deficiency in the yellow, the green and the orange.

Here is another thing: I really want to be frank with you and live up to my new name. I was named Frank in the letters sent to members. My real name is Fred. We all know that there are a number of colors that are affected differently by the Fade-Ometer than by sunlight. I mean not many, but there are some. You gentlemen that have made tests will probably recall that the colors that the Fade-Ometer does not affect to as great an extent as sunlight are usually the blues and the violets, and the Fade-Ometer arc is very rich in that end of the spectrum, very rich in the violet. I am not speaking of ultra-violet now—in the violet and the blues. And the blues almost invariably are the ones, of the few that fade differently, that stand up in the Fade-Ometer but fade in sunlight.

To illustrate: You have Direct Sky Blue 6-B, which we all know is fugitive but stands up pretty well in the Fade-Ometer. We have 2-B Blue, 3-B Blue, Brilliant Blue 5-G, the German material. We have a number of the developed blacks, Black V, Black BH, Benzo Azurine in the blues. We have Acid Violet 4-B and ordinary Wool Violet. They don't fade quite as much in the Fade-Ometer as they do in sunlight.

One the other hand, you will probably notice that in the Fade-Ometer we get somewhat excessive fading, in some of the yellows, oranges, and there are greens; and the Fade-Ometer arc is deficient in that end of the spectrum. It is quite a coincidence. I believe any of you people in the dyestuff industry that have been using the Fade-Ometer will admit that most of the colors that fade more are the yellows, the oranges and the greens, or perhaps, let me add, the yellow-browns and the red-browns; and those that fade less in the Fade-Ometer are the blues and the violets as a rule. Of course, there are others. There are a few reds that don't fade as much in the Fade-Ometer as they do in the sun, and some fade a little more. But I just thought I would mention that fact.

Does that explain what you meant, Doctor?

Dr. Graenicher: My question simply is: What scientific data have we available pertaining to different wave lengths which are active in the destruction of colors?

Mr. Schlayer: I don't know of anything. I have no data available.

Dr. Graenicher: Has the Fade-Ometer been used for photo-chemical purposes?

Mr. Schlayer: I know the Eastman Kodak Company have two or three of them, but just what they use them for up there I don't know. But as far as making tests and fading with the different wave lengths and perhaps using the Fade-Ometer as a source and then using a screen and then trying to fade colors, I think that is something that perhaps the American Association of Textile Chemists and Colorists can do sometime.

Dr. Graenicher: What can we do to make our fugitive dyes fast? They may be made fast by imposing a film which will be a light filter. Just what is the source of trouble and how can it be overcome?

Mr. Schlayer: I don't believe we know just at this time. You take on some of the direct blues, like Sky Blue FF, Benzo Copper blues, etc., we use copper sulphate and we get good sun fastnesses, not comparable with a vat color, but we get good sun fast colors. I don't know of anybody that has conducted the experiments that you have reference to, neither do I know of any other particular chemical or intermediate that we could put on the color and make it more sun fast. That would be something for our chemical manufacturers.

Dr. Graenicher: It is important, because we don't want to be satisfied with this. But what can we do about it?

Mr. Schlayer: Some people have recommended glucose. It does in a number of cases make colors somewhat faster, but to my knowledge, there is no chemical or size or anything on the market that will make sunfast most direct colors or acid colors that are more or less

fugitive. I don't know of any. Have you heard of any yourself?

Dr. Graenicher: It amounts to individual treatments for colors, and processing for the coloring in general, which could be applied to other colors at the same time. The colors which you desire most are the colors which are the least fast, and consequently, we should see what we can do to improve them.

Mr. Schlayer: There are methods on cotton in the dye stuff line. There are also a few greens and browns that can be aftertreated, but when you make a mixture, you're licked.

Chairman Gaede: I am afraid we will have to allow some time for our second paper, and if we have time at the end of the second paper to discuss this subject a little further, we will do so at that time.

We have with us Mr. Hugh Mosher, chief chemist of the United States Testing Company, who was with us two years ago on a similar subject, and since then he has done further work on it. He is here tonight to give us "Some Fleeting Glimpses of Certain Properties of Sericin." I would like to introduce Mr. Hugh Mosher. (Applause.)

Mr. Mosher's paper will appear in the next issue of the AMERICAN DYESTUFF REPORTER.

"Unusual Reactions of Cellulose"

By WALTER M. SCOTT, Ph.D.

A Correction

In an article under the above title, published on page 246 of the Proceedings of the American Association of Textile Chemists and Colorists under date of July 6, 1931, the following statement was made: "Cellulose or a suitable cellulose conversion product (such as hydrocellulose or reverted cellulose) is treated with the desired organic acid in the presence of chloracetic anhydride and a catalyst such as magnesium perchlorate. Curiously enough the chloracetic anhydride, while promoting the combination of cellulose with the organic acid in question, does not itself enter into the reaction at all."

The author has since learned that the above statement is capable of misinterpretation. When it was stated that the chloracetic anhydride does not enter into the reaction, it was the esterification reaction which was particularly referred to. In other words, the resultant ester of cellulose is not a chloracetic ester nor is there any chlorine in the finished product. The water which is eliminated during the reaction is taken up by the chloracetic anhydride and this is in turn converted into chloracetic acid, but the cellulose ester which is produced is the ester of whatever other organic acid is present in the reaction mixture.

ACTIVITIES OF NORTH CAROLINA STATE COLLEGE STUDENT SECTION

THE members of the Student Chapter of American Association of Textile Chemists and Colorists of the North Carolina State College, Textile School played an important part in the recent textile exposition and style show.

It was through the earnest efforts on the part of some of these men that fancy spray printing patterns were made and placed on display. Interesting photomicrographs of various yarns and defective fabrics were shown as the results of intensive laboratory work and fancy men's half hose, made by the students, were dyed and finished.

Members of the Junior Section of A.A.T.C.C. assisted in dyeing and finishing the yarn used in the fabrics that won valuable prizes in the style show. These fabrics were made into coat suits, beach pajamas, fancy dresses, sport suits, negligees and model coats by students of the Home Economic Classes of Meredith College and Peace Junior College, Raleigh, N. C.; Louisburg College, Louisburg, N. C.; Queens-Chicora College, Charlotte, N. C., and Catauba College, Salisbury, N. C.

Miss Nell York, Cary, N. C., a Meredith College student, was awarded the grand prize. She wore a handsome coat made from a green and white figured double plain fabric, designed and woven by textile students.

SERIES OF LECTURES

The Student Chapter of the American Association of Textile Chemists and Colorists located at North Carolina State College, Textile School, had as their guest, Mr. N. R. Vieira, who was with us for two days giving lectures to various classes in the Textile School.

Mr. Vieira, who was with the Newport Chemical Works before it was recently taken over by the E. I. du Pont de Nemours Company and who is now located with the latter organization, is well known as a demonstrator of dyestuffs. His experience along this line enables him to give useful information to the students.

Besides the demonstrations in the laboratory, Mr. Vieira gave the following lectures:

1. "Characteristics of the various classes of dyes." He discussed directs, sulphurs, developed, naphthols and vats and was specific in stating the advantages and disadvantages of each type for different fibers and fabrics.

2. "Kinds of machines used in dyeing." Here he discussed the raw stock machines, yarn dyeing in skeins, warp and package; piece dyeing in jigs, padders and continuous types. This lecture was illustrated with pictures on the screen.

3. "Preparation of materials to be dyed." He discussed the various methods of scouring and bleaching. Blackboard diagrams as well as pictures were used in this lecture.

4. "Use of Color Indexes and Color Cards." Fastness tests as recommended by the A.A.T.C.C. were also brought into the discussion.

Respectfully submitted,

D. B. HARDIN,
Secretary.

APRIL MEETING, NORTHERN NEW ENGLAND SECTION

THE Northern New England Section met at the Andover Country Club, in Shawsheen Village, Mass., on Friday evening, April 8. At dinner 101 were present, and at the meeting about 115. A program of questions arranged by Alex. Morrison and Clarence Nutting aroused lively discussion.

The next meeting will be in Riverbank Court Hotel, Cambridge, on Saturday evening, May 7. There will be an outing at the Andover Country Club on June 10.

Respectfully submitted,

HAROLD C. CHAPIN,
Secretary.

SUB-COMMITTEE ON METHODS OF ANALYSIS AND STANDARDIZATION OF SULPHONATED OILS

A SUB-COMMITTEE of the Research Committee has been recently appointed to consider the analysis and standardization of sulphonated oils. The personnel of this committee will be as follows:

Ralph Hart, *Chairman*
George P. Feindel
Stephen K. Ford
A. H. Grimshaw
R. A. Pingree
C. P. Gulick
Wm. Seltzer
W. T. Thomas
A. R. Thompson, Jr.
Walter S. Williams

It is believed that this committee offers a real opportunity for service to the textile and allied industries. The wide-spread use of sulphonated oils and their modifications renders this undertaking of prime technical and commercial importance.

Among previous work bearing on the assignment of this committee may be mentioned the following: The American Leather Chemists Association had the matter investigated several years ago by committees with a similar scope as ours. Their work resulted in the present A.L.C.A. tentative and official methods for the analysis of sulphonated oils. "Wizöff" a German technical association, has the same subject now under consideration. More recently the Sulphonated Oil Manufacturers Association in conjunction with the Bureau of Standards has been at work on grading-methods. We shall endeavor to utilize and profit by all information thus made available to us.

In this investigation, it is proposed to study only those sulphonated oils that split off their sulphated radical upon boiling with mineral acid. This is along the line of work carried on by the A.L.C.A. and also "Wizöff." It is proposed to investigate the subject as follows and in the order given:

(a) Methods of analysis.
(b) Specifications.
(c) Grading.

Most of the work will evidently be devoted to methods of analysis. The literature in this respect is quite extensive and our efforts will be directed in selecting and adapting the most suitable methods. Samples and procedures for their analysis will be furnished by the chairman to members as soon as the committee-work gets under way.

As for specifications, a study will be made of a number of representative sulphonated oils on the market, made by reliable manufacturers according to satisfactory commercial practice, and the resulting data will be used to establish the desirable relationship in the various components of sulphonated oils.

Under grading, an attempt will be made to develop a system of nomenclature that is simple in its application, that will adequately describe the oil and which will be fair to both consumers and producers.

The chairman will be pleased to receive any suggestions from members of the Association in regard to the work of this committee.

APPLICANTS FOR MEMBERSHIP

Active

S. J. Tatelman, Chemist, Foreman & Clarke Mfg. Co., 28 West 23rd St., New York, N. Y. Sponsors: Fred Schlayer and David Aibel.

Chester A. Howe, Vice-President and Director, Carbic Color & Chemical Co., Inc., 135 Oliver St., Boston, Mass. Sponsors: Henry D. Grimes and Alex. Morrison.

Karl Hahn, Chemist, National Aniline & Chemical Co., 40 Rector St., New York, N. Y. Sponsors: Wm. A. Holst, Jr., and A. K. Gyzander.

Harry I. Emmons, Overseer of Dyeing, Shawsheen Mills, Andover, Mass. Sponsors: Fred A. Dushame and Henry D. Grimes.

C. B. Suttle, Representative, A. Klipstein & Co., Charlotte, N. C. Sponsors: Paul F. Haddock and A. R. Thompson, Jr.

Robert R. Farwell, Salesman, E. I. du Pont de Nemours & Co., 709 Hospital Trust Building, Providence, R. I. Sponsors: R. A. Pingree and Wm. H. Cady.

Raymond J. Morin, Assistant to Superintendent, Guerin Mills, Inc., Rosemont Mill, Woonsocket, R. I. Sponsors: Alex. Morrison and A. Newton Graves.

G. Adolph E. Wessman, Consulting Research Chemist, W. C. Durfee, Inc., 516 Atlantic Ave., Boston, Mass. Sponsors: John H. Grady and Amos K. Hobby.

A. T. Glenn, Dyer, Wilson Finishing Co., Burlington, N. C. Sponsors: R. R. Dorsett and A. R. Thompson, Jr.

Sherman Y. Alexander, Chemist, Dyestuff Corp. of America, 281 Franklin St., Boston, Mass. Sponsors: H. R. Davies and W. H. Zillessen.

Junior

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Student

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Max. D. Plovnick, Textile Chemistry & Dyeing, Lowell Textile Institute, Lowell, Mass. Sponsor: L. A. Olney.

Leo Gleklen, Chemistry, Lowell Textile Institute, Lowell, Mass. Sponsor: L. A. Olney.

Edward Babegan, Student, Lowell Textile Institute, Lowell, Mass. Sponsor: L. A. Olney.

Stanley E. Wojas, Student, Lowell Textile Institute, Lowell, Mass. Sponsor: L. A. Olney.

MEETING OF LOWELL TEXTILE SECTION

A meeting of the Lowell Textile Student Section was held in the Assembly Hall of the Institute on Monday evening, April 11th. Prof. Brugmann of the Massachusetts Institute of Technology gave a talk on "Tendering of Cotton by Sunlight." This was of particular interest to the students as it fitted in very well with their course on textile testing. He explained very clearly, and pointed out by means of charts the various tests which confirmed the belief that sunlight does deteriorate cotton. At the conclusion of his lecture a spirited discussion took place. A lunch was then served.

The meeting was arranged by John H. Skinkle of the Chemistry Department, Chairman Pizzuto presiding.

There was an attendance of about 40.

Respectfully submitted,

RAYMOND L. MATTHEWS,
Secretary.

Note

The paper, "The Use of Monel Metal Equipment for Dyeing with Developed Colors, Stripping and Bleaching," appearing in the April 25th issue, on page (179) 283 was presented at the March Meeting of the Northern New England Section.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

A. NEWTON GRAVES,
Franklin Process Co.,
Providence, R. I.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto

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A BRIGHT SPOT

A BRIGHT spot appears on the economic horizon in the form of a statement just made public by the Swann Chemical Company. As the result of a comprehensive survey covering a large part of the United States, new sales offices are being established in five of the large centers and sales representatives are being placed in ten other cities by this company. This represents an increase of fifty per cent in the sales force of this organization. In 1932 this is news, and favorable news at that—and should receive the serious consideration of other business enterprises.

The fact that this expansion is not based on guesswork or mere hope is another favorable circumstance. About nine months ago they decided to obtain more information about the extent of their available market than they possessed, and consequently began a survey to determine the requirements of all chemical users. They sent representatives into various states making a complete canvass and calling upon every consumer of chemicals from the largest to the smallest. The information obtained enabled them to increase their business from month to month and at the same time assured them that their policy of expansion was basically sound.

An important note is sounded in a statement made recently by the president of this company. It was as follows:

"The most important feature of our survey is that it is constantly bringing to light uses for newly developed products of our research laboratories and new applications for old products. If the net result of our work was merely to take business away from others, it would not be worth doing, as any gains that we might make could be as easily taken away from us by similar tactics on the part of our competitors. We are, however, discovering many ways of increasing the total use of chemicals. Business of this kind is creative—it brings new values into existence and provides the best, if not the only, remedy for our present economic ills."

What this company is doing is *creating* a market for its products, or if a market is found, creating a product suitable for use therein. There are many benefits to such a program. It keeps laboratory and market research workers busy, it makes potential raw materials valuable, it increases the consumption of an excess of other raw materials, it increases the amount of business being done and encourages freer circulation of money. These benefits should not be overlooked; they will help our country immeasurably.

Of more direct interest to the chemist specifically is the further statement of the president:

"Ten years ago we were rescued from depression largely by mechanical and electrical developments, such as the automobile, the radio, and so forth. With the automobile particularly a multitude of new demands were created and a multitude of new products had to be provided to fill these demands.

"Today the chemical industry is one of the most progressive. I am confident that America can look to the chemical developments of this decade for the restoration of business activity and that the era into which we are entering will be predominantly a Chemical Era."

This statement should not be misconstrued to mean that chemistry alone will be the salvation of industry, but the fact remains that it will fill a large gap in our economic structure when it is properly applied and promoted. We wish to emphasize that intelligent expansion at the present time, particularly in new products and the creation of new markets, should be fostered by aggressive concerns.

SILK WEIGHTING

A PROGRESSIVE step was taken recently when the Federal Trade Commission held a meeting attended by many of the leaders in the silk industry and its allied fields for the purpose of taking constructive action to clarify the situation regarding pure dye silks and weighted silks. It is to the credit of those who attended this session that a really practical resolution was adopted, the effect of which ought to improve the industry. This resolution reads as follows: "Goods containing in the finished state silk or silk and other fiber or fibers and more than 10 per cent of any substance other than silk or such fiber or fibers except black, which shall not exceed 15 per cent, shall be designated by a designation containing reference to silk or such other fiber or fibers unless there be added the word 'weighted,' or some other qualification that shall reasonably indicate that such goods contain an addition of metallic salts or other substance.

"Pure dye goods: Goods containing silk, or silk and fiber or fibers, shall not be designated pure dye if they contain in the finished state more than 10 per cent of

any substance other than silk or such other fiber or fibers except black, which shall not exceed 15 per cent.

"Mixed goods: Goods containing silk and other fiber or fibers shall not be designated by a designation containing reference to silk unless there be added to such designation some qualification which shall reasonably indicate that such goods contain fiber other than silk. If the designation of any goods coming within the category of 'mixed goods' contains any reference to silk there shall be added to such designation words that such reasonably indicate that such goods contains fibers other than silk, and the major fiber shall be the fiber first listed in such designation."

The adoption of the above rules was preceded by a long discussion, in which retailers, converters and dyers and finishers engaged. One retailer suggested that goods containing less than 10 per cent of any substance except metallic salts be known as pure dye, goods weighing up to 50 per cent be known as "silks," and goods containing more than 50 per cent of metallic salts be designated as "weighted."

Fellowships and Scholarships Awarded

RESEARCH fellowship and scholarship awards in the field of chemistry, physics, biology and engineering planned to bring about scientific knowledge and advancement in the textile industries and their allied branches were announced recently by the Textile Foundation.

The broad purpose impulsing this far reaching program is to build up and develop a body of research trained individuals who although engaged in scientific fields will at the same time be working and thinking in terms of textile fiber and material development.

Producers and manufacturers have a growing appreciation of the indispensable partnership between research and the ever changing technique of production, and will welcome this new reservoir of scientific knowledge and talent. Then again it is possible that during the course of the contemplated studies something quite new may be developed having implications of tremendous significance.

As indicating the country-wide interest in the plan, nearly seven hundred requests for applications were received by the Directors, from thirty-nine states.

In making the selections the Directors were fortunate in having the active help of a group of advisors whose positions and accomplishments in the world of science are notable.

Following is a list of those to whom awards were made, their present place of residence or occupation, and under whom and where they will probably work. It is expected that some of the work will be under way early in May.

Senior Fellowships

Wayne A. Sisson, now at the University of Illinois, to work under Dr. George L. Clark, at the University of Illinois, Urbana, Ill.

John Smith Reese IV, Wilmington, Del., to work under Dr. Arthur Lapworth, Professor of Chemistry, at Manchester University, Manchester, England.

G. Gordon Osborne, now at Massachusetts Institute of Technology, to work under Dr. E. R. Schwarz, at Massachusetts Institute of Technology.

Donovan Joseph Salley, now at Princeton, to work under Dr. H. S. Taylor, at Princeton University.

Orrin Weston Pineo, now at Massachusetts Institute of Technology, to work under Dr. A. C. Hardy, at Massachusetts Institute of Technology.

Donald R. Morey, now at Cornell, to work under Ernest Merritt at Cornell University.

John Burgess Calkin, now at Massachusetts Institute of Technology, to work under Dr. Wilder D. Bancroft at Cornell.

Raymond Leonard Steinberger, now at Harvard, to work under Dr. P. K. Bridgman, at Harvard.

Junior Fellowships

Wilbur Otis Teeters, now at the University of Illinois, to work under Dr. R. L. Shriner, at the University of Illinois.

Bernard Sidney Gould, now at Massachusetts Institute of Technology, to work under Dr. F. F. Blackman, Reader of Botany, St. John's College, Cambridge, England.

Alfred H. Rogers, now at Lehigh University, to work under Dr. H. M. Ullman, at Lehigh.

Bryce Prindle, now at Massachusetts Institute of Technology, to work under Dr. S. C. Prescott, at Massachusetts Institute of Technology.

Maxwelton S. Campbell, now at the University of North Carolina, to work under Dr. Thorndike Saville, at the University of North Carolina.

Herbert E. Ritchey, now at Virginia Military Institute, to work under Dr. Roger Adams, at the University of Illinois, Urbana, Ill.

Lawrence B. Haley, now at Alabama Polytechnic Institute, to work under Dr. H. G. Gordon, at Alabama Polytechnic Institute, Auburn, Ala.

Roland Linwood Lee, Jr., now at Clemson Agricultural College, Clemson, S. C., to work under Dr. H. J. Ball, at Lowell Textile Institute Lowell, Massachusetts.

Scholarships

John Crossley Broadmeadow, now at New Bedford Textile School, to work under Dr. Thomas Nelson, at North Carolina State College, Raleigh, N. C.

Alva Dean Zellner, now at Georgia Tech., to work under Dr. H. S. Busby, at Georgia Tech.

Fred L. Greenwood, now at Dickinson College, to work under Dr. M. W. Eddy and Dr. E. A. Vuilleumier, at Dickinson College, Carlisle, Penna.

Albert Graham Fisher, now at Clemson Agricultural College, to work under Dr. H. H. Willis and Dr. H. V. Hunter, at Clemson College.

The very broad scope of the research work to be

(Continued on page 321)

Practical Notes on Dyeing Aniline Black

(Continued from page 302)

Copper Aniline Black

Turning now to the copper Aniline Black process it will at once be seen that this differs in several material points from the prussiate process apart from the fact that copper sulphate instead of sodium ferrocyanide is employed. In the first place, copper salts appear to be much more active as catalysts than does the ferrocyanide so that formation of the Aniline Black pigment within the cotton fibers proceeds much more easily and rapidly.

Process

It is obviously possible to vary within wide limits the composition of the copper padding liquor but the following will be found to give satisfactory results:

Aniline	31 lbs.
Hydrochloric acid of 28° Tw.	43.5 lbs.
Sodium chlorate	20 lbs.
Copper sulphate	4 lbs.
Total volume	40 gals.

Features

The above liquor contains no excess of acid, and aniline hydrochloride itself may be used instead of adding separately aniline and hydrochloric acid. This is because when copper sulphate is added to a solution of aniline hydrochloride to which aniline in excess has been added, there is formed almost immediately a greenish yellow and often crystalline precipitate which of course renders the liquor quite unsuitable for dyeing. This precipitate does not form when the liquor contains exactly the aniline equivalent of the hydrochloric acid or in a liquor which contains excess of acid. In the copper process therefore the padding liquor never contains excess of aniline as in the prussiate process.

A further distinctive feature of the copper process is that the formation of the black pigment proceeds at a low temperature. Practically no development of black takes place in the prussiate process under 90° C. but with copper as the catalyst the black forms moderately slowly at room temperature and quite rapidly at 60° C. Consequently it is usual to age or steam the padded fabric at a moderately low temperature.

Plant

The plant for dyeing Aniline Black by means of the copper process is shown in Fig. 5 (Mather & Platt, Ltd.). Two padding mangles M are provided, the fabric on leaving these being further dried on the cylinders D, and then led through a brick ageing chamber C containing an upper and lower series of driven wood winches. The fabric passes over these winches and the atmosphere within the chamber is heated by means of closed steam coils and live steam is blown in to maintain a suitable humidity. Tension compensators T are arranged between the three sections of the plant in order to allow for temporary differences in speed or travel of the fabric.

After-chroming Plant

An after-chroming plant is necessary, and this may take the form of that used for the prussiate Aniline Black process as previously described or the after-chroming may be carried out on jigs. Some Aniline Black dyers find it impossible to avoid after-chroming in a jig although this is not economical as regards the time taken, but other dyers are able to age their fabric to a state such that continuous after-chroming is satisfactory.

Tendering

As previously pointed out the copper process makes use of a padding liquor which is definitely strongly acid—hydrochloric acid being one of the strongest mineral acids, and aniline being but a very weak base. This fact involves two important considerations. Firstly there is a danger of seriously tendering the fabric being dyed, and secondly the resulting black is liable to be greenable. It is common experience that the black pigment formed under strongly acid conditions is more greenable than one formed under neutral or alkaline conditions.

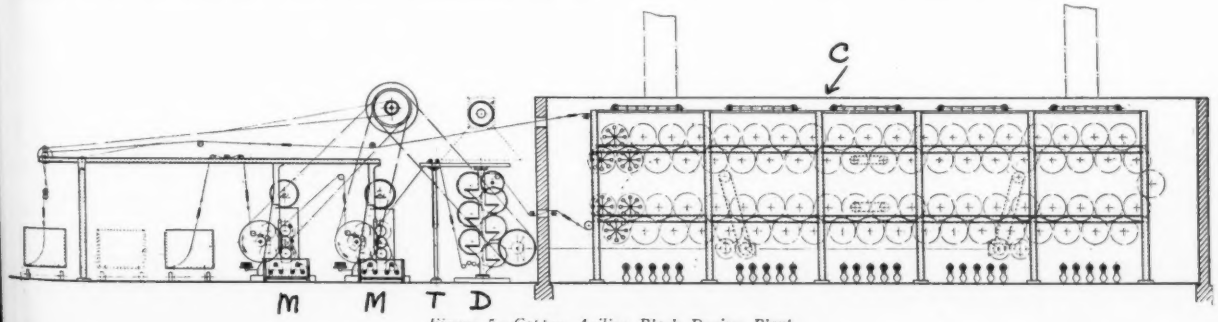


Figure 5—Copper Aniline Black Dyeing Plant.

In order to avoid tendering, two methods are open. It is possible to add a slightly basic inorganic salt to the padding liquor such that the excess acidity is gradually neutralized during ageing; aluminium acetate or sodium acetate are suitable for this purpose. But perhaps a more satisfactory method consists of adding to the padding liquor an organic catalyst which promotes oxidation of the aniline and thus enables the period of ageing or the temperature of ageing to be reduced. Para-phenylene diamine is quite suitable for this purpose. Unfortunately it is somewhat costly but the extra cost is amply compensated for. An alternative catalyst is 2:4-diaminodiphenylamine which can be prepared more cheaply but this tends to give the resulting black a somewhat redder shade and this is a disadvantage. Usually about 10% (calculated on the weight of aniline) of one of these catalysts is sufficient.

Ungreenable Black

Rendering of the black ungreenable is most satisfactorily accomplished by the use of aniline in the after-chroming liquor. It is more necessary to use aniline in this manner than is the case with the prussiate process for it must be remembered that the development of the black is not carred so far. Thus after ageing and immediately before after-chroming, the fabric in the copper process is dark bottle green whereas it is a deep black at the same stage in the prussiate process. It is also more desirable in the copper process that after-chroming should be carried out warm or hot.

Fabrics Other Than Cotton

So far, consideration has been given only to fabrics which contain cotton only, but there is also a demand for goods containing either or both cellulose acetate and viscose rayons. The production of a good black on these materials demands special care.

Cotton-Viscose

When cotton fabric contains viscose rayon there is a distinct tendency for the rayon to acquire a much heavier shade than the cotton and this is mainly because the cotton is a less absorbent fiber. The remedy consists of preparing the fabric very thoroughly by boiling with a dilute solution of sodium carbonate; this scarcely affects the absorbency of the viscose rayon but it materially increases that of the cotton by reason of the fact that it results in a partial removal of natural fatty matters which give the cotton an impervious character. An alternative method would consist of adding a suitable wetting out agent to the padding liquor but so far the writer has found none which is sufficiently stable.

If a cotton-viscose rayon fabric is dyed such that the appearance is good while the cotton is only dyed to a small extent (the viscose thus giving the good appearance) it will usually be found that the cotton is readily greenable while the viscose rayon is not. Hence the desirability for securing equal depths of shade on both fibers.

Cellulose Acetate Rayon

In contrast to viscose rayon, it is found that cellulose acetate rayon has practically no affinity for Aniline Black as dyed by the prussiate method particularly, and in the case of the copper method good results are seldom obtained. There is only one really satisfactory method for dyeing cotton fabric containing cellulose acetate rayon and that consists of partially hydrolyzing the rayon with an alkali before dyeing; the fabric may then be dyed in the usual manner as employed for cotton.

Hydrolysis is most conveniently effected by padding the fabric with a dilute solution of soda ash and then leading it through a steaming chamber (as in printing or Aniline Black dyeing). An alternative process consists of treating the fabric in a jig with a hot solution of caustic soda or caustic potash. The progress of the hydrolysis should be followed by dyeing together with a direct dye, say Chlorazol Fast Red K, a portion of the hydrolyzed fabric; hydrolysis is sufficiently advanced when the rayon just dyes to a shade slightly less deep than the cotton. After removing the alkali by washing, souring, and washing, the fabric is dried previous to dyeing with a copper or prussiate Aniline Black.

At first it might be thought that it was very dangerous to dye Aniline Black on rayon materials, but experience shows that the resulting loss of strength is quite normal and the wearing properties of a cotton-rayon fabric dyed with this type of black are not seriously affected.

Black cotton-rayon (cellulose acetate) fabrics are largely used for linings of dress goods, and it is a valuable point that when such a fabric is dyed with Aniline Black as outlined above, the fabric is much less affected by hot ironing. It would appear that the slight degree of hydrolysis and the presence of mineral and organic pigments in the rayon highers the temperatures at which it commences to fuse or melt.

Fastness to Greening

Before concluding this article on Aniline Black dyeing it is necessary to say something about the fastness to greening of fabric dyed with this color, for this fastness is of the greatest importance. A perfectly satisfactory Aniline Black dyed fabric should not redden with alkalis or green when exposed to the action of a reducing substance such as sulphur dioxide gas or a solution of sodium bisulphite.

Various tests have been suggested for deciding the fastness to greening of Aniline Black dyed materials but the writer has found the following one most satisfactory. Apparatus is set up as shown in Fig. 6. Sulphur dioxide gas from a bottle of the liquefied gas is led through a quantity of water contained in bottle A and thence into the base of cylinder B. The fabric F is suspended within the cylinder B (the neck is loosely plugged with cotton wool sufficient to allow but a slow passage of the gas) and is thus exposed to *moist* sulphur dioxide; it is important that the gas should be moist. Exposure is carried

out for five minutes and the fabric is then withdrawn and compared with a sample before exposure. This test is very convenient and is similar to the conditions of exposure of the fabric during wear since it is generally due to the sulphur dioxide present in the atmosphere of the town that causes greening.

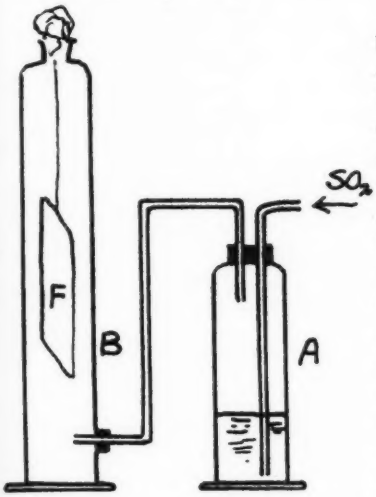


Figure 6

As regards the production of fast Aniline Black dyed fabrics it is interesting to notice that a twice-dyed fabric is always of exceptional fastness. Even when the second dyeing is effected with a very weak padding liquor the fastness is considerably increased. As previously pointed out, the amount of tendering cause by the second dyeing is usually negligible so that there is no objection to this method for obtaining very fast dyeings except that it halves the output.

Testing for Aniline Black

Finally the following are the most useful methods for testing whether or not a fabric has been dyed with Aniline Black:

Test 1. Immerse the fabric in a hot solution of commercial sodium hypochlorite diluted about twenty times. Aniline Black dyed fabric bleaches to a yellow or brownish yellow color, while a sulphur black discharges to white; a direct color will also be completely discharged.

Test 2. Warm the fabric with a solution of sodium hydrosulphite, then wash and expose to the air. Aniline Black dyed fabric will bleach to a dark yellow and a sulphur black to a yellow color; both re-oxidize to black on exposure to air. A direct black is discharged to white or pale yellow and the black shade does not return on aerial oxidation.

Test 3. Immerse the fabric in a small quantity of concentrated sulphuric acid for about ten minutes with occasional stirring until the fabric is completely disintegrated. Then dilute rapidly with water. If a green solution results then the black is Aniline Black. A sulphur black gives a reddish solution, and a Naphthol AS black gives a vivid bright green which is quite readily distinguishable from the dull green of the Aniline Black.

The results of the above three tests taken together always enables an Aniline Black dyed fabric to be recognized.

Fellowships and Scholarships Awarded

(Continued from page 318)

undertaken is indicated by some of the projects already assigned. The work to be done will be much more inclusive than indicated by the titles, which have been selected as merely denominating the general character of the assignments.

X-Ray Analysis of Fiber
Orientation of the Constituents of the Benzene Ring
Micro Analysis of Fibers
Protective Effects in Textile Deterioration and Dye Fastness
Spectrophotometric Analysis of Dyed Materials
Application of Polarized Light to Textile Research
Adsorption and Absorption of Solutions by Textile Materials
Elastic and Plastic Properties of Textiles
Influences of Protein Constituents on Wool Fibers
The Mildewing of Textiles
The Effect of Bacteria and Vegetable Oils on Silk
Microbiology of Textile Fibers
The Disposal and Recovery of Textile Wastes
The Chemistry of Dyes
Strength and Wearing Properties of Textile Fabrics
Critical Study of Manufacturing Processes
Chemical Research Bearing on Textile Fibers
Chemistry of Rayon and Silk
Chemical and Biological Studies on Wool
Fastness of Dyestuffs

The Textile Foundation, with headquarters in Washington, D. C., began its operations in the fall of 1930 and was created to engage in scientific and economic research for the benefit and development of the textile industry, its allied branches, and including that of production of raw materials.

The officers of the Foundation are:

Franklin W. Hobbs, Chairman
Stuart W. Cramer, Treasurer
Arthur M. Hyde, Secretary of Agriculture
Robert P. Lamont, Secretary of Commerce
Henry B. Thompson
Edward T. Pickard, Secretary and Assistant Treasurer.

R & H Sodium Perborate

The Roessler & Hasslacher Chemical Co. has recently issued a folder entitled "A Few Popular Uses of R & H Sodium Perborate."

This folder is a ready reference on the properties and uses of this active oxygen product. Its contents, we believe, will be of interest to the many readers of our publication who are concerned with oxidation processes.

Copies may be obtained from the company.

Technical Notes from Foreign Sources

All-Wool Bathing Costumes; Dyeings Fast to Sea-water

Textile Journal of Australia—Textil-Chemiker u. Colorist 12, 16 (1931) (*Deutscher Faerber-Ztg. suppl.*)—The older-fashioned cotton bathing suits have been giving way more and more of late years to woollen ones, on account of the greater elasticity of the woollen costume itself, permitting greater freedom of movement without a feeling of restraint, and also because of the greater warmth of the woollen garb. Cotton bathing suits were capable of being dyed with Indanthrene dyestuffs, which gave any desired tone and shade in a quality very fast to light and water; but with the modern wool garments it is more difficult to attain the older standards set. The chrome dyestuffs would naturally be thought of first, and as a class they are fast enough to light and water, the two great tests to which the dyeings in question must be put. They bleed into the white, however, when white forms a component of the color-scheme—at least, sea-water and thermal-spring water cause bleeding. Then, too, the public is not, in general, as careful with bathing suits as with ordinary, more pretentious, regular clothing; bathing suits are "left around" in a wet condition for considerable periods sometimes, which of course increases greatly the danger of bleeding.

Other objections:— the demand for light and brilliant tones frequently bars out the sulphur dyestuffs; and, further, the softness of texture, to the touch, suffers to a certain extent, unless the dyeing includes such a substance as Protectol in the bath. Dyers are going over, therefore, to the acid dyestuffs, which are fast to water, though not always to light.

Of the acid dyestuffs which give clear tones and are also fast to sea-water, and have proved satisfactory in use, Fulling O.H_3G, and H_3G, are good examples. They give almost any desired shade of yellow, of good fastness to light, and of tones almost as clear as Quinoline Yellow. In combination with Brilliant Indocyanine, Fulling Yellow H_3G gives a very clear green, which resembles Brilliant Green very closely. This Indocyanine, however, which gives such very clear and luminous blues, is not sufficiently fast to light, so that the brand 6B has to be used. This is very fast to light. The two dyestuffs, the yellow and the blue, are indispensible.

Green tones of excellent fastness to light can be produced by combination of the various brands of Fulling Yellow with Alizarine Cyanine Green G extra, or 5G. The choosing of suitable dyestuffs for orange and red tones is an easier task, as the Supranols, a series of more recent dyestuffs, are available. These can be used singly, or with any other red, and afford a series of tones ranging from a fiery, yellowish scarlet to the deepest wine-red, all of very good fastness to light, and of still better fastness toward sea-water. The brands available are Supranol Orange RR, Supranol Red R, Supranol Scarlet G, Supranol Red BB, Supranol Bordeaux B, and Supranol Brilliant Red B.

Marine Blue is dyed with Sulphone Cyanine 5R extra and GR extra; for black, Sulphone Cyanine Black BB. Better than the last, however, is Chromogen Black ETOO special, which is more suitable in that it does not injure the wool. Gray, drab, brown, blue, and other mode-tones are best dyed with the Palatine Fast series of dyestuffs, fast to light and sea-water, and easily applied. Of these, Palatines Fast Orange GX, Fast Bordeaux RX, and Fast Blue GGX dye level in combination with other acid dyestuffs, and, if a yellow is desired, Palatine Fast Yellow is to be recommended.

For goods containing white wool, which are to be subjected to the sulphur bleach, the Sulphone Cyanines should not be used for marine blue or black, but the chrome dyestuffs are more suitable.

Beside the dyestuffs already mentioned, of which some, as the Brilliant Indocyanines, are not as satisfactory in light-fastness as might be desired, there are others which are more satisfactory in this particular; Sulphone Orange G, Alizarine Rubinol RGW*, Alizarine Greanol B*, Acid Anthracene Red 3BL, Supramine Violet R, Alizarine Astrol Violet B, Alizarine Pure Blue G and B*, Supramine Green G, Alizarine Cyanine Green 3G. Those marked with an asterisk are somewhat less fast to sea-water.

To make the bathing suits somewhat less permeable to water, Ramasit WD conc. can be used; one impregnation with this material accomplishes the purpose, and also imparts a soft, pleasant feel to the fabric.

It should be noticed that the dyer will do well not to give an absolute guarantee of fastness toward sea-water, for the chemical composition of sea-water, and especially of thermal-spring water, is not always the same, and so its action upon the dyeings varies. (This is certainly true of the water of the thermal springs of Australasia, but is it true of all sea-water?).

Crepe-Effects on Woollen Goods

O. Braun—Textil-Chemiker u. Colorist 12, 17 (1931) (*Deutscher Faerber-Ztg., suppl.*)—A process for producing crepe-effects upon woollen weaves, originated by Seifert, and laid before the Société Mulhouse for investigation, has been given the approval of the Société experts. The salient points of the method are as follows—

It has been found that favorable results are obtained by printing of a paste, containing 1500 g. of calcium sul-

phocyanide and one liter of gum tragacanth thickener, upon wool weaves, followed by steaming, without tension. Color-effects can be attained by shading with acid dyestuffs. Barium sulphocyanide acts in the same way, but ammonium sulphocyanide, alone or in presence of metallic or sodium salts, does not produce the effect of contraction of the fiber. In 1897 Knecht proposed to print woollen weaves with an acid, then to pass through a bleach-bath, and then to full the wool, through which a local chloring of the wool takes place. The carrying out of the process on the large scale would lead to serious difficulties, but the referees of the Société report that the Seifert method gives excellent results. The substances which have the power of causing the crepeing of the wool at a higher temperature are very various in nature, but they appear in general to be those which exert a dehydrating action—zinc chloride, calcium chloride—or a reductive action—stannous salts, the bisulphites, the hydrosulphites.

It has not yet been decided whether all of these substances act in the same manner. It is remarkable that tin-salt, printed on, from a roll engraved to the ordinary depth, in a concentration of 150 g. to the liter of paste, produces the desired effect, while this same effect is attained by zinc chloride only at a concentration of 1000 g. to the liter. Some of the substances used act similarly to concentrated acids, by dehydration of the wool-substance; while others act as reducing agents pure and simple, possibly through desulphurization of the fiber. These ideas, however, in the absence of sufficient experimental work, are only hypothetical, necessarily so in view of the extraordinarily complex nature of keratin. Tin oxide alone causes no crepeing of the fiber, but does produce the effect in presence of a substance of acid nature, such as tartaric acid, ammonium chloride, aluminium sulphate, or when the tin is used as chloride.

The degree of alteration of the fiber varies according to the substance used for the purpose. Thus, tin-salt, which most easily produces the crepe-effect, alters the wool-substance most profoundly, while, on the other hand, the action of sulphocyanides in this way is hardly noticeable. Tin chloride, used with the caution necessary, causes no alteration of the substance of the fiber.

When metallic salts are employed, dissociation of these takes place during the steaming. The chlorides form hydrochloric acid, and this passes into the air or steam, while the fiber becomes loaded with the metallic oxide or hydroxide, a point which can be proved by treating the material with alizarine paste. In the description of his process, Seifert states also that the material undergoes alteration in nature by the action of the substance producing the crepeing. The affinity of the wool toward dyestuffs increases, as in the case of cotton when mercerized with caustic soda or zinc chloride.

The action of the steaming appears to be principally due only to the elevated temperature, since dry air at a like temperature produces the same effect. However, the dampness, when steaming is employed, keeps the wool-fiber pliant, prevents too great a concentration of the substance reacting, and so diminishes correspondingly the danger of an undesirable alteration of the wool.

Dyebeakers of Krupp Stainless Steel

Monats. f. Textil-Ind. 46, 244 (1931)—A report upon tests made with dyebeakers of V2A and V4A, non-rusting Krupp steel, by the Warenpruefungsamt f.d. Textil-Gewerbe Gladbach-Rheydt.

The tests were made with the care always requisite in such cases; i.e., in this instance, parallel tests were carried out in porcelain beakers, and in two each of the two kinds of steel beakers, and the after-treatment of the goods used for the tests was carried out under exactly the same conditions. The tests covered chlorine bleaching with bleaching powder, in which case a plain reaction for iron was found in the baths for the V2A, and much less for the V4A beakers, and hardly a trace for the porcelain beakers; the oxygen bleach, with baths of 3.5 g. of sodium peroxide per liter, in which case no iron could be detected afterward in the baths in any case; dyeings upon cotton with various substantive dyestuffs, including aftertreatment with formaldehyde in presence of acetic acid, hot, in which case again no difference at all in any dyeings could be detected; and dyeings upon wool, in which case acid dyestuffs, Palatine Fast dyestuffs, afterchrome colors, and metachrome colors were used. According to the procedure recommended by the manufacturers of each dyestuff, Glauber salt, sulphuric acid, acetic acid, potassium chromate, metachrome mordant, etc., were used as assistants. The dyestuffs chosen were all of bright shades. Practically no difference in the dyeings could be detected, except with Metachrome Violet 2R, which came out, with the steel beakers, a little browner in tone than was the case with the porcelain beakers. Palatine Fast Red RN and Metachrome Green G showed barely noticeable differences in tone. In the different dyeings, there was placed in each beaker a weighed clipping of the same kind of steel as that of which the beaker was formed, and this clipping afterward washed, dried, and reweighed. No loss of weight could be detected; i.e., there was no detectible corrosion from the components of the baths.

NEW PATENTS

(*Abstracted by Synthetic Organic Chemical Mfrs. Ass'n*)

Composition of Matter Suitable for Dyeing. (A new composition of matter, a mixture comprising a 2,3-hydroxynaphthoic acid arylide and an alkali starch compound being resistant to air, soluble in water and having utility in dyeing and printing processes.) Winfrid Hentrich, of Wiesdorf-on-the-Rhine, Anton Ossenbeck, of Cologne-Mulheim, and Ernst Tietze, of Cologne-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,851,511, Mar. 29, 1932.

Trisazo Dyestuffs. (Prepared by tetrazotizing the diamino azo dyestuffs derived from p-phenylene diamino carboxylic acids and coupling them, advantageously in the presence of tertiary bases, with the desired azo component; dye cotton fast red violet to black shades.) Rich-

ard Stusser, of Cologne-Deutz, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,852,032, April 5, 1932.

Manufacture of Dyestuffs of the Acridine Series and the Product. (Brown to violet-brown basic dyestuffs, consists in titrating a tetraalkyldiaminoacridine containing probably one or two nitro groups and finally oxidizing the leuco compound thus formed.) Manfred Alioth, of Basel, Switzerland, assignor to firm of "Durand & Huguenin S.A." of Basel, Switzerland, No. 1,852,730, April 5, 1932.

Production of Vat Dyestuffs. (Dichlor-dibrom-allo-ms-naphthodianthrones. A division of above Patent No. 1,841,961.) Max Albert Kunz, of Mannheim, and Karl Koberle, of Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,841,966, January 19, 1932.

Manufacture of Halogenated Dyes and Halogenated Intermediates for Dyes. (Relates to an improved process of halogenation which comprises treatment while in suspension such as phthalic anhydride and succinic anhydride.) Cecil Shaw, of Polmont, Robert Fraser Thomson, of Grangemouth, and John Thomas, of Polmont, Scotland, assignors to Imperial Chemical Industries, Ltd., No. 1,842,694, January 26, 1932.

Azo Dyestuffs. (Obtained by coupling diazotized aminoarylsulphonic acid amides or aminoarylcarboxylic acid amides or their derivatives, such as their halogen or nitro derivatives, with 1-phenyl-3-methyl-5-pyrazolones; give yellow to orange dyeings of good fastness properties, still further improved by afterchroming on the fiber). Hans Krizkalla, of Mannheim, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,846,644, February 23, 1932.

Azo-Dyestuffs and Process of Making Same. (Obtained by coupling an aromatic unsulfonated diazo-compound with pyrazolone derivatives such as the methyl or the ethyl ester of the 5-pyrazolone-3-carboxylic acid produced by the condensation of an oxalacetic acid ester with hydrazine. Dye cellulose varnishes, such as Zapon varnishes, clear orange tints very fast to light. A division of patent No. 1,791,432, dated February 3, 1931.) Max Schmid, of Riehen, near Basel, and Fritz Straub, of Basel, Switzerland, assignors to Society of Chemical Industry in Basle of Basel, Switzerland, No. 1,847,022, February 23, 1932.

Production of Azo Dyestuffs and Color Lakes Thereof. (Comprises producing an azo coloring matter in the presence of an inert naphthalene sulphonic acid, in which at least one hydrogen atom in the nucleus is substituted by a hydrocarbon side chain. A continuation in part of copending application Ser. No. 103,967, filed April 22, 1926.) Carl Immerheiser, of Lehnitz, near Oranienburg, and Bodo Zschimmer, Martin Fritsch, and Hanns Fleischmann, of Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,847,650, March 1, 1932.

Manufacture and Use of Vat Dyes of the Benzanthrone Series. (Yield grey to black shades on cotton, the process consisting in the condensation of an unsulphonated benzanthrone with a hydroxylamine compound, fusing the condensation product with alkali and recovering the vat dye thus obtained.) Arnold Shepherdson and Sidney Thornley, of Blackley, Manchester, Eng., assignors to British Dyestuffs Corp., Ltd., of Manchester, Eng., No. 1,848,227, Mar. 8, 1932.

Manufacture of Acid Dyestuff of the Phenonaphthosafranine Series and the Products. (Blue to green-blue acid dyestuffs obtained by condensing an unsymmetrical N-alkyl-paraphenylenediamine derivative having a sulpho-group in ortho position to the primary amino-group with an isorosinduline sulphonic acid having a sulpho group in position 1 and another in position 6.) Paul Laeuger, of Basel, Switzerland, assignor to the firm: J. R. Geigy S. A., of Basel, Switzerland, No. 1,850,838, Mar. 22, 1932.

Manufacture of Acid Dyestuffs of the Phenonaphthosafranine Series and the Products. (New acid dyestuffs made on the base of the aforesaid process (see Patent 1850,838) when such isorosinduline di- or tri-sulphonic acids are used as contain in the 1-position a halogen instead of a sulpho-group.) Paul Laeuger, of Basel, Switzerland, assignor to the firm of J. R. Geigy S. A., of Basel, Switzerland, No. 1,850,839, Mar. 22, 1932.

Manufacture of Acid Dyestuffs of the Phenonaphthosafranine Series and the Products. (New dyestuffs made on the base of the aforesaid process (see Patent 1,850,838) when instead of isorosindulinesulphonic acids containing a sulpho-group in 1- or 2-position, sulphonic acids of such isorosindulines are used as contain no acid substituents in positions 1, 2 and 4.) Paul Laeuger, of Basel, Switzerland, assignor to the firm of J. R. Geigy S. A., of Basel, Switzerland, No. 1,850,840, Mar. 22, 1932.

Manufacture of Acid Dyestuffs of the Phenonaphthosafranine Series and the Products. (An extension of above U. S. Patent 1,850,838, dyestuffs equally fast to alkali containing a sulpho-group in ortho-(16)-position, obtained by treating with sulphonating agents certain phenonaphthosafranines non-sulphonated in the unsymmetrical N-alkylated para-phenylene-diamine residue attached by condensation.) Paul Laeuger, of Basel, Switzerland, assignor to the firm: J. R. Geigy S. A., of Basel, Switzerland, No. 1,850,841, Mar. 22, 1932.

Manufacture of Acid Dyestuffs of the Phenonaphthosafranine Series and the Products. (A division of application Ser. No. 166,021, filed Feb. 4, 1927, above Patent No. 1,850,838.) Paul Laeuger, of Basel, Switzerland, assignor to the firm: J. R. Geigy S.A. of Basel, Switzerland, No. 1,850,842, Mar. 22, 1932.

Manufacture of Dyeing Conversion Products of Azo-Dyestuffs. (Comprises subjecting a monoazo dyestuff, formed by coupling a diazotized amino-sulphonic acid compound of the benzene and naphthalene series with resorcin, to the action of an oxidizing agent in the presence of ammonia; dye leather brown to brown-violet tints

of excellent fastness to light and alkaline fat liquor.) Eduard Hagenbach, Carl Mettler, and Erich Wanner, of Basel, Switzerland, assignors to the firm of J. R. Geigy S. A., of Basel, Switzerland, No. 1,850,875, Mar. 22, 1932.

Method of Making Black and Gray Vat Dyes and the Products Thereof. (Consists in treating benzanthrone sulphonic acids with hydroxylamine and then subjecting the product obtained to alkaline fusion.) Arnold Shepherdson and Sidney Thornley, of Blackley, Manchester, Eng., assignors to British Dyestuffs Corp., Ltd., of Manchester, Eng., No. 1,848,228, Mar. 8, 1932.

Process of Producing Formic Acid. (Relates to an improvement which consists in decomposing formate of calcium with about an equimolecular quantity of concentrated sulphuric acid.) David Strauss and Rudolf Uhsemann, of Bitterfeld, Ger., assignors to I. G. Farbenindustrie Aktiengesellschaft, of Frankfort-on-the-Main, Ger., No. 1,848,504, Mar. 8, 1932.

Thiophenol Tanning and Mordanting Agents. (Relates to modification in process described in U. S. Patent No. 1,757,400, which comprises performing the reaction with an additional amount of the phenolic compound and removing the excess of the phenolic compound.) Alfred Thauss, of Cologne-Deutz/Rhine, and Fritz Ballauf, of Elberfeld, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,848,506, Mar. 8 1932.

Dyestuffs of the Anthraquinone Series. (Obtainable by heating an 1-amino-4-halogenanthraquinone-2-sulphonic acid in the presence of water, a suitable acid binding agent and a cuprous salt, dyeing wool from an acid bath blue shades, turning to greenish-grey to black on after-chroming, and possessing good fastness properties, especially to fulling and light.) Klaus Weinand, of Leverkusen, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,848,509, Mar. 8, 1932.

New Acid Wool Dyestuffs of the Anthraquinone Series. (Obtained by reacting upon quinizarine-6-sulphonic acid with para-aminoformanilide or para-aminoacetanilide or such derivatives of these compounds as are substituted at the nitrogen atom by alkyl groups; dye wool from an acid bath even yellowish-green of good fastness.) Klaus Weinand, of Leverqusen-on-the-Rhine, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,848,510, Mar. 8, 1932.

Mordant Dyestuffs and Process of Making Same. (For example, comprises diazotizing 4-amino-2-sulpho-benzene-azo-salicylic acid (made for example by interaction of the diazo compound of para-nitraniline-ortho-sulphonic acid with salicylic acid and reduction of the nitro group in the monoazo dyestuff) at the amino group, the resulting diazo compound being made alkaline with ammonia; dye chromium mordanted fiber fast brown shades.) Georg Ostertag, of Basel, Switzerland, assignor to the Firm "Durand & Huguenin S.A.", of Basel, Switzerland, No. 1,848,650, Mar. 8, 1932.

Azo-Dyestuffs and Process of Making Same. (Yield yellow shades, suitable for coloring lacquers, varnishes, esters or ethers of cellulose, for instance Zapon varnish or acetate silk, made by coupling diazotized esters of nucleally not sulphonated ortho-aminophenols with nucleally not sulphonated aromatic compounds.) Friedrich Felix, of Basel, Switzerland, assignor to Society of Chemical Industry in Basle, of Basel, Switzerland, No. 1,848,772, Mar. 8, 1932.

Process of Producing Sulphonic Acids. (A tanning composition comprising sulphonated naphthalene in admixture with a small quantity of a sulphonated derivative of a more readily sulphonatable compound of the benzene series.) Joseph Bennett Hill, of Phila., Pa., assignor to the Barrett Co., No. 1,848,883, Mar. 8, 1932.

Disazo-Dyestuffs and Process of Making Same. (For example, comprises coupling aniline-2-sulphonic acid with 1-amino-2-methoxynaphthalene-6-sulphonic acid and further coupling with 2-phenylamino-5-hydroxy-naphthalene-7-sulphonic acid; yield fast and level blue and grey tints on cotton and viscose.) Joseph Gyr, of Basel, Switzerland, assignor to the firm of Society of Chemical Industry in Basle, of Basel, Switzerland, No. 1,849,572, Mar. 15, 1932.

Disazo-Dyestuffs and Process of Making Same. (A division of application Serial No. 424,021, filed January 28, 1930, above patent No. 1,849,572.) Joseph Gyr, of Basel, Switzerland, assignor to Society of Chemical Industry in Basle, of Basel, Switzerland, No. 1,849,573, Mar. 15, 1932.

Mordant Dyestuffs and Process of Making Same. (For example, obtained by diazotizing 4-amino-2-sulphobenzene-azo-salicylic acid at the amino group; dye chromium mordanted fiber fast mainly brown shades. Dyestuffs of the present invention are similar to those of co-pending application Ser. No. 243,475, filed Dec. 29, 1927.) Georg Ostertag, of Basel, Switzerland, assignor to the firm of Durand & Huguenin S. A., of Basel, Switzerland, No. 1,849,587, Mar. 15, 1932.

Production of New Vat Dyestuffs of the Anthraquinone Acridone Series and the Products. (Relates to the production of Bz-dichloro-4-amino-anthraquinone-1.2-acridone from the said new arylamide compounds by condensation of a chlorinated anthraquinone-1.2-acridone with aromatic acid amides; dye cotton violet to blue shades of very good fastness.) Fritz Ullmann, of Geneva, Switzerland, assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,850,482, Mar. 22, 1932.

Process of Preparing Azo-Dyestuffs. (Comprises the step of coupling the diazotized monoazodyestuff from diazotized 1-amino-8-hydroxy naphthalene-3.6-disulphonic acid and 3-amino-4-cresol methylether with a molecular proportion of 1-(4'-amino-benzoyl-)-amino-8-hydroxy naphthalene-6-sulphonic acid in aqueous pyridine; yield blue grey, bluish-grey or green shades of excellent fastness properties.) Winfrid Hentrich, of Wiesdorf-on-the-Rhine, Josef Hilger, of Cologne-Mulheim, and Richard Stroebel, of Opladen, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,850,547, Mar. 22, 1932.

Dyeing or Printing. (According to claim 1, the process

consists in applying an enolic ethereal salt of indanthrone to a material, and then developing the color by means of a cupric salt.) James Ivor Morgan Jones and William Kilby, of Lancaster, Eng., assignors to Scottish Dyes, Ltd., of Grangemouth, Scotland, No. 1,850,551, Mar. 22, 1932.

Vat Dyestuffs of the Anthraquinone-Acridone Series and Process of Making Same. (Comprises heating the reaction products of alkaline condensing agents on bz-1-benzanthronyl-1-amino-amino-anthraquinone compounds with an acylating agent.) Heinrich Neresheimer, of Ludwigshafen-on-the-Rhine, and Ernst Honold, of Frankfort-on-the-Main-Fechenheim, Ger., assignors to General Aniline Wks. Inc., of N. Y., N. Y., No. 1,850,562, Mar. 22, 1932.

Indigoid Dyestuffs and Process of Making Same. (As a step in the manufacture of new indigoid dyestuffs, the production of dichloroacetyl-o-toluidine (CH_3:NH-CO-CH_3:Cl:Cl = 1:2:4:5) which consists in heating chloroacetyl-o-toluidine (CH_3:NH-CO-CH_3:Cl = 1:2:4) with chlorinating agents; dye cotton fast red to violet and Bordeaux tints.) Richard Tobler, of Basel, Switzerland, assignor to firm: Society of Chemical Industry in Basle, of Basel, Switzerland, No. 1,851,070, Mar. 29, 1932.

(*Bluish-Green*) *Vat Dyestuffs of the Anthraquinone Acridone Series.* (The reaction product of 1-amino-2.4-dibromoanthraquinone potassium 2-amino-3.5-dichlorobenzoate, cyclohexanol and cupric chloride.) Robert Berliner, of Leverkusen-on-the-Rhine, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,851,082, Mar. 29, 1932.

New Azo Dyestuffs. (Obtained, for example, by coupling the tetrazo compound of 4.4'-diamino diphenyl urea-3.3'-dicarboxylic acid with the sodium sulfonate of aceto acet-ortho-chloranilide; dye vegetable fiber clear yellow, orange and brown shades of satisfactory fastness to light and becoming very fast to light and especially washing when treated with metal salts. Winfrid Hentrich and Max Hardtmann, of Wiesdorf-on-the-Rhine, Rudolf Knoche, of Leverkusen-on-the-Rhine, and Richard Stusser, of Cologne-Deutz, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,851,097, March 29, 1932.

New Vat Dyestuffs of the N-Dihydro-1.2-2'.1'-Anthraquinone Azine Series. (Comprises reacting upon a halogenated N-dihydro-1.2-2'.1'-anthraquinone azine with cuprous cyanide in the presence of a liquid tertiary hetero cyclic starting material; dye cotton from a hydrosulphite vat strong blue to green shades.) Robert E. Schmidt, Berthold Stein and Kurt Bamberger, of Elberfeld, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,851,114, Mar. 29, 1932.

Dyestuffs Containing Metal and Process of Making Same. (Consists in treating ortho-hydroxy-azo-dyestuffs with a metal compound obtainable by reaction, in presence of a caustic alkali, between glycerine, and a hydroxide of copper; dye cotton in a neutral bath reddish blue shades of a very good fastness to light.) Fritz Straub, of Basel, Hermann Schneider, of Riehen, near Basel, and Hans Mayer, of Basel, Switzerland, assignor to Society of Chemical Industry in Basle, of Basle, Switzerland, No. 1,851,118, Mar. 29, 1932.

Metalliferous Dyestuffs and Process of Making Same. (Comprises coupling diazotized anthranilic acid with 2-amino-5-hydroxy-naphthalene-7-sulfonic acid and coupling this product with 5-nitro-2-amino-1-phenol and treating with chromium fluoride; dye cotton, and particularly artificial silk derived from regenerated cellulose, such as striped viscose, uniform and fast greyish tints.) Fritz Straub, of Basel, and Walter Hanhart, of Riehen, near Basel, Switzerland, assignors to the firm of Society of Chemical Industry in Basle, of Basel, Switzerland, No. 1,851,119, Mar. 29, 1932.

Azo Dyestuffs. (Obtainable by coupling tetrazotized 4:4'-diamino-diphenyl-urea-3:3'-disulfonic acid with acetoacetic acid ortho anisidid sulfonic acid in a solution rendered alkaline by sodium carbonate; dye cotton and artificial silk bright yellow shades fast to water and washing; usable also as lake colors and for dyeing paper.) Richard Stusser, of Cologne-Deutz., Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,851,120, Mar. 29, 1932.

Substantive Azo Dyestuffs. (Obtained by coupling tetrazotized 4:4'-diamino-diphenyl-3:3'-dicarboxylic acid with 8-hydroxy-1-phenylamino-naphthalene-4-sulfonic acid; dye cotton and regenerated cellulose red to green shades fast to water, washing and light, when after-treated with suitable metal salts.) Richard Stusser, of Cologne-Deutz, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,851,121, Mar. 29, 1932.

Polish Coal-Tar By-Products Output Falls in 1931

According to Commercial Attache Clayton Lane, Warsaw, the production of coal-tar products by Upper Silesian coke plants since 1929 has shown a general downward trend. Stocks in the hands of manufacturers at the end of 1931 remained abnormally high and foreign competition, especially from Soviet products, was being felt by producers.

	1928	1929	1930	1931
	M. tons	*M. tons*	*M. tons*	*M. tons*
Crude tar	78,689	86,832	80,500	68,943
Prepared tar	24,105	22,820	21,400	17,923
Pitch	37,632	41,814	40,500	27,983
Tar oils	21,109	24,714	18,320	20,780
Benzol, crude	21,144	23,082	24,800	22,170
Benzol, pure	15,584	13,806	13,200	4,086
Ammonium sulphate	24,832	36,144	35,500	21,472
Naphthalene, crude	2,135	2,384	1,780	1,581
Naphthalene, pure	390	501	610	444
Phenol and cresol	1,350	1,297	630	2,563
Pyridine bases	111	112	75	79

Swiss Exports of Coal-Tar Dyes Increase

Swiss exports of coal-tar dyes (except indigo) in 1931 were higher than during 1930. Shipments of all coal-tar

dyes (except indigo) in 1931 totaled 6,928,728 kilos, worth 67,456,662 francs while in 1930 they reached 6,744,134 kilos and a value of 66,951,087 francs. Exports of indigo and indigo solution were 1,468,303 kilos worth 3,695,640 francs in 1931 and 1,436,505 kilos at the higher value of 3,915,078 francs. (Value of franc in 1930 and 1931 = $0.193 United States currency.)—(World trade notes.)

Czechoslovakia Dye Trade Maintained in 1931

According to Assistant Trade Commissioner Sam E. Woods, Prague, imports of dyes totaled 4,037 metric tons values at approximately $3,897,260 in 1931 as compared to 4,101 tons valued at $3,898,560 in the preceding year, according to the State Statistical Office, Czechoslovakia. Czechoslovak exports of dyes rose from 1,180 tons valued at $471,270 in 1930 to 1,511 tons valued at $501,840 in 1931.

Annual Meeting of Color Card Association

At the seventeenth annual meeting of the Textile Color Card Association of the U. S., Inc., held on April 15th at the headquarters of the Association, the following officers were elected:

Charles Pinnell, president, Fred Butterfield & Co.; Roy E. Tilles, 1st vice-president, Gotham Silk Hosiery Co.; Armand Schwab, 2nd vice-president, Amberg, Schwab & Co., and Alfred L. Simon, treasurer, Alfred L. Simon & Co.

In addition to the above officers, the following were also elected as members of the Board of Directors:

Albert L. Gifford, Worumbo Co.; William Hand, John Hand & Sons; Edward S. Johnson, James G. Johnson & Co., and J. Laird Schober, Laird Schober & Co.

Margaret Hayden Rorke was re-elected secretary and managing director.

New Literature

"Your Treating Problems"

The above is the title of a new booklet published by the Laurel Soap Manufacturing Co., Inc., of Philadelphia, Pa. It is a treatment of the applications of Laurel treating agents to the textile industry. Copies may be obtained on request.

"Emulsions"

The Carbide and Carbon Chemicals Corp. of 30 East 42nd Street, New York City, have recently issued a booklet entitled "Emulsions" which was prepared by their research department and contains much valuable and interesting information on the subject. Included in the booklet are discussions of the following subjects: Solvent Emulsions, Wool Lubrication, Leather Emulsions, Emulsion Paints, Wax Polishes, Automobile Polish, Sizing Emulsions, Pharmaceuticals, Cutting Oils, Orchard Sprays, Rayon Oils, Oil Polish, Cosmetics, Cleansing Creams and Shaving Creams.

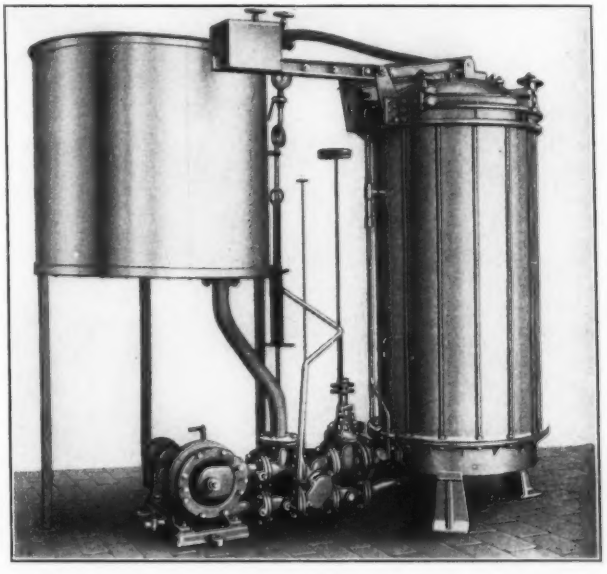
Survey of Perfume and Cosmetic Colors

At the request of its members, the Research Department of the American Manufacturers of Toilet Articles, is compiling a list of American-made colors now being offered to the cosmetic and perfume industry of the United States. Dye manufacturers who have not already received a notice regarding this may obtain cards to be filled out from Prof. Marston T. Bogert, Columbia University, New York City.

Rayon Package Dyeing Machine

The American Obermaier Corp., 20 Hunters Point Ave., Long Island City, N. Y., has perfected a rayon package dyeing machine that is said to have proven to be most excellent in practical use.

They have been working on this model for the past five years and put several of these machines into practical operation about six months ago. They have dyed several hundred thousand pounds of rayon in the package form and delivered the dyed rayon to all sorts of different trades, namely: weaving, knitting, upholstery, and plushes. All of the dyed rayon has been consumed and from everywhere the most satisfactory results are said to have been reported.



The machines so far manufactured and in operation are made for one and two cases capacity, and the construction is of all nickeline. The advantages claimed by the manufacturer are:

The elimination of costly skein winding.

The preservation of the original quality without the break of a single filament.

The elimination of bar-effects, which always exist in skein dyeing.

The manufacturers also guarantee absolute even dyeing of 2-lb. packages.

S.O.C.M.A. Meeting

The regular general meeting and luncheon of the Synthetic Organic Chemical Manufacturers Association was held at the Chemists' Club, 52 East 42nd Street, New York City, on Thursday, April 14th, 1932, President Merz presided. The manufacturers' excise tax was discussed and it was the general opinion of the meeting that the tax levies should be on the broadest possible base, particularly in regard to manufactured products, and that there should be opposition to selected levies on any of the products of industry. Mr. Lamb of the Association's counsel, described at length the inferences and the possibilities arising from the recent decision of the U. S. Court of Customs and Patent Appeals on the dye mixture case and how the door had now been opened, by the direction of this Court to the Trial Justice, in reopening the case to accept all the testimony as to trade practice previously excluded.

The outing of the association will be held at the Seaview Golf Club, Absecon, N. J., the first week-end in June.

Ultra Opens Canadian Plant

The Ultra Chemical Works, Inc. of Hawthorne, N. J., has opened a manufacturing plant at Louiseville, Que., Canada.

They manufacture the following items: Sulphonated Oils, Finishing Materials, Gums, Sizings, and Textile Specialties.

Due to the better business conditions in Canada, the production is said to be very gratifying.

1932 Fall Woolen Colors

Rich Bordeaux and mellowed Burgundy tones, forecast as a high-fashioned development for Fall, will occupy an important place in the collection of fifty new colors portrayed in the 1932 Fall Woolen Card, soon to be issued by the Textile Color Card Association. Margaret Hayden Rorke, managing director of the organization, announced recently that confidential swatches of the new shades had just been issued to the Association's members in the woolen industry.

The mahogany range, including rhum and spicy hues, is likewise cited as another highlight in Fall color fashions. Despite the growing style significance of reds, Mrs. Rorke stated that the brown family shows every indication of occupying an even stronger position than it did last Winter. In addition to the reddish mahogany gammê mentioned above, a dark tete de negre range is also represented, the darkest tone being described as an ebony brown, almost black.

A deep beetroot shade, more purplish in cast than the vintage reds, is also accorded fashion prestige for Fall. Rich, clear tones of red, including a smart raspberry hue, likewise figure prominently.

New interpretations of tile shades, some inclining to red and terra cotta, others bordering on brown, are also included in the Fall color group. In the beige range, preference is expressed for sandy and grege tones, as well as a yellowish beige of the honey type.

Blues presented for early Fall embrace a wide range. In addition to classic navies, there are clear royal hues of slightly purplish cast for sportswear, soft ceramic types with an undertone of violet, also smoke and hazy blues.

Although greens will be of lesser style significance for Fall, the deeper Oriental tones of yellowish cast are of major interest in this family. Lively crude greens will continue to enjoy favor in the sports mode, as will also bright citron and other fruity hues of yellowish undertone.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

EXECUTIVE HEAD

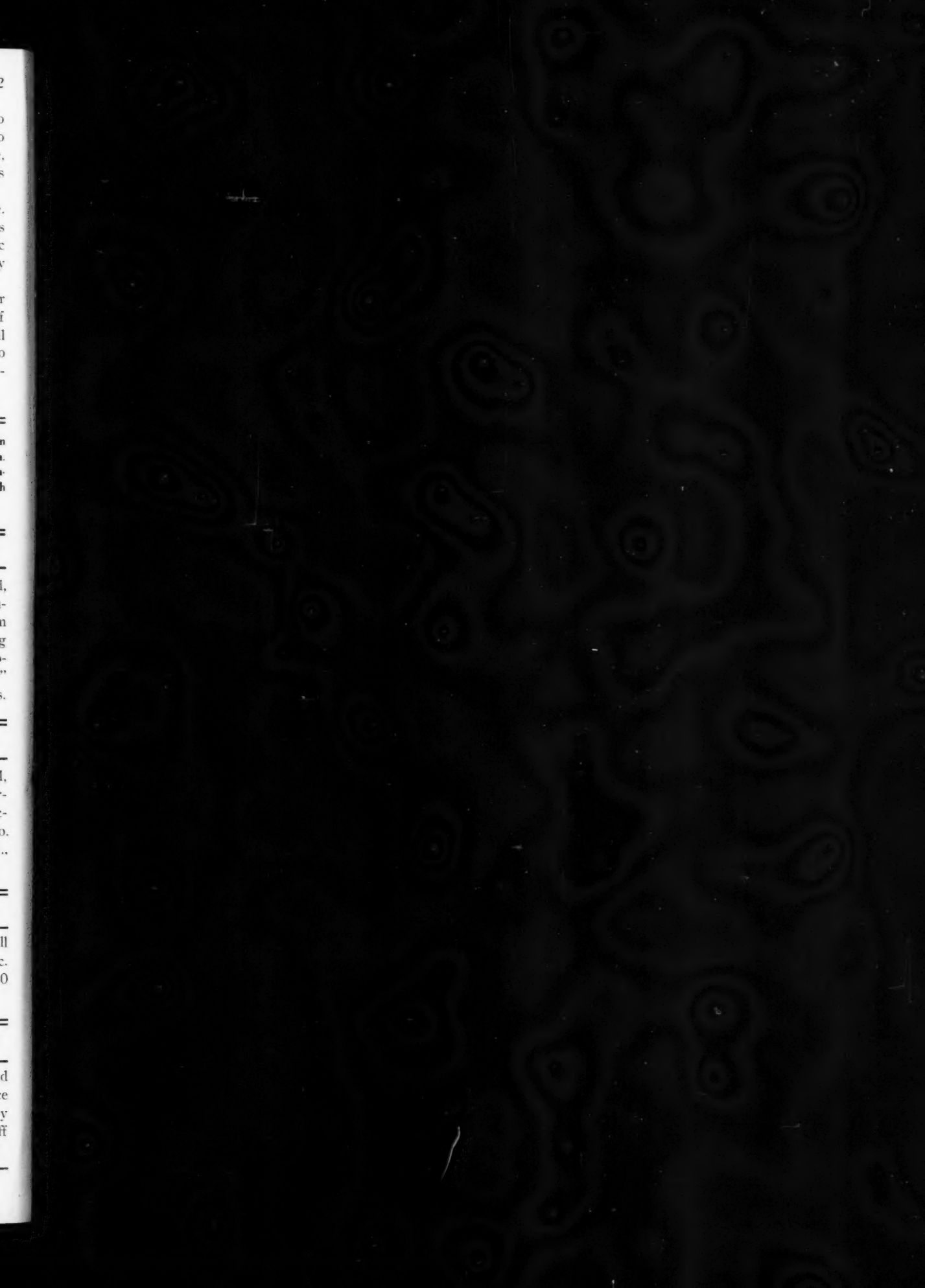
Bradford Dyeing Association (U. S. A.), Bradford, Rhode Island, invites applications for position of Executive Head. Applications will only be considered from those thoroughly experienced in all branches of dyeing and finishing of Cottons, Rayons and Acetate Silks. Applications in the first instant endorsed "Executive Head" should be addressed to the Treasurer at the above address.

DYER

Six years' experience at bleaching and dyeing wool, cotton, jute and union raw stocks and yarns. Thoroughly experienced in all stages of carpet manufacture. Age, 26; married. Address: Classified Box No. 731, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

FADE-OMETER WANTED

Second-hand—commercial type preferred. Give full particulars, including condition, age, type, voltage, etc. Address Box 732, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED

A man thoroughly experienced in the manufacture and compounding of textile finishes, especially for silk piece goods. In reply give details as to qualifications and salary expected. Address Box No. 733, American Dyestuff Reporter, 440 Fourth Avenue, New York.